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The International Journal of Orthodontia

Editor: Martin Dewey, D.D.S., M.D.

VOL. II ST. LOUIS, NOVEMBER, 1916 NO. 11

ORIGINAL ARTICLES

A STUDY OF THE CUBIC CAPACITY AND SUPERFICIAL AREA OF THE MAXILLARY SINUS

BY VIRGIL LOEB, A.B., M.D., D.D.S., ST. LOUIS.
Professor of Oral Surgery, St. Louis Dental College.

DURING June, 1912, the writer read a paper before the section on Stomatology of the American Medical Association at Atlantic City, in which he reported measurements he had made in studying the cubic capacity and superficial area of the maxillary sinuses in twenty-one heads.[1] At the time this paper was presented, the original casts, the photographs of which accompany this article, were shown. Because of the interest which orthodontists have in the anatomy of the face and particularly the jaw, it was thought advisable to add some observations which were not recorded at that time.

The maxillary sinus (Antrum of Highmore) has been studied *in situ,* from an anatomic standpoint, by many men; but few have attempted accurately to reproduce the sinus in some concrete form and make observations of it in this manner. Some have determined the cubical capacity of several pairs of these sinuses and were forced to destroy the heads in making the observations, but, so far, no report has been made in the literature of the superficial area of the sinus.

The report here presented is the result of a study made on the maxillary sinuses in which I have determined the cubic capacity and superficial areas of twenty-one pairs without destroying the original heads. This work is based on the method used by H. W. Loeb[2] in studies of the sphenoid sinus, presented before the Third International Laryngo-Rhinological Congress at Berlin, August, 1911.

MATERIAL.

The heads used in the study here presented were preserved by injecting a fifty per cent dilution of liquor formaldehydi through the carotid; they were

[1]Jour. Amer. Med. Assn., Aug. 3, 1912.
[2]Loeb, H. W.: Ann. Otol., Rhinol. and Laryngol., March, 1912.

decalcified by soaking in a three per cent solution of hydrochloric acid for from three to five months. They were then cut horizontally in sections about one inch thick by means of a very sharp knife. These heads are from the Anatom-

Head III. Exact size.

Head IV. Exact size.

Head V. Exact size.

ical Department of the St. Louis University. All were heads of adults, and in no instance was it possible to ascertain any history of the individual.

METHODS OF MAKING PLASTER CASTS AND THEIR GROSS APPEARANCE.

The portion of the sinus lying within the adjacent sections was filled with soft plaster-of-Paris which when hardened was removed and the adjacent por-

Head VI. Exact size.

Head VII. Exact size.

tions united with a thin layer of very soft plaster. This finally resulted in a complete cast of each sinus.

The plaster casts, forty-two in number, representing twenty-one heads, give a clear idea of the size, form and irregular contour of the sinuses. These casts are mounted in pairs and show the relation of the right and left sides.

The right and left of each pair of sinuses are more or less symmetrical, but vary in size. They are roughly triangular in shape with the apex posterior, and with all the walls practically triangular except the internal, which is more or less quadrilateral. While the two sinuses of one head usually are similar, they differ materially from those of any other head.

In photographing the casts, a great deal of the detail has been lost. Each

sinus is very irregular, which increases the superficial area. Because of this many of the casts which appear smaller than others may have a greater superficial area.

Head VIII. Exact size.

Head X. Exact size.

Head XI. Exact size.

CUBIC CAPACITY.

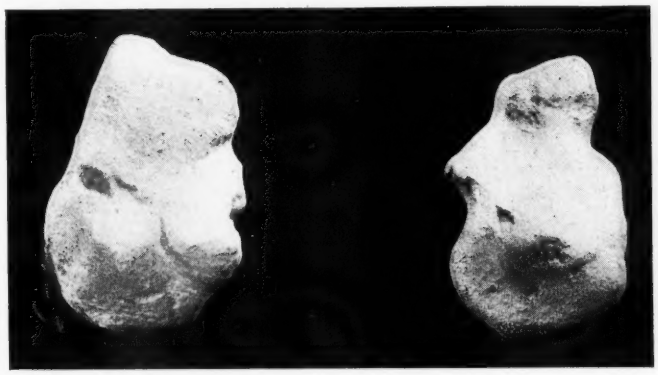
The measurement of the displacement of water resulting from the immersion of a body in water gives the volume of cubic capacity.

Since these casts are made of a porous material, they were first allowed to remain for several minutes in melted paraffin so that the interspaces might be

made impervious to water. After this the cubic capacity was ascertained volumetrically as follows:

HEAD	RIGHT IN C.C.	LEFT IN C.C.
III	8.0	7.5
IV	24.8	24.5
V	24.5	19.2
VI	16.8	13.0
VII	13.9	14.5
VIII	7.0	4.9
X	10.2	10.0
XI	14.5	15.2
XII	10.0	7.2
XIV	13.0	14.8
XV	13.0	9.6
XVI	4.5	4.8
XVII	12.0	8.0
XVIII	11.5	4.8
XIX	12.5	18.5
XX	14.9	15.2
XXII	14.7	8.5
XXVIII	11.0	9.0
XXIX	8.5	7.5
XXX	18.3	15.0
XXXI	9.5	6.2
Average	13.02	12.85

The general average was 12.94 c.c.



Head XII. Exact size.

Head XIV. Exact size.

These results show the extremes to be head 16 right, 4.5 c.c., and head 4 right, 24.8 c.c. The average, however, of the right side is very near that of the left.

SUPERFICIAL AREA.

Adhesive plaster as used by H. W. Loeb, in connection with the superficial area of the sphenoid sinuses, was employed in determining the superficial area of the maxillary sinuses. A strip equaling 25 sq. cm. (5x5) was placed

Head xv. Exact size.

with the adhesive part down, on a small plate of glass, without stretching. With a sharp knife pieces were cut and fitted on each cast until it was entirely covered, care being taken that the pieces did not overlap.

It is safe to say that this method is not subject to an error of two per cent; in fact, it is more than likely that there is not more than 0.5 per cent of error.

The results in square centimeters are as follows:

HEAD	RIGHT	LEFT
III	25.9	25.2
IV	52.3	48.4
V	51.3	45.8
VI	43.1	37.0
VII	34.2	37.7
VIII	27.7	21.2
X	29.0	29.7
XI	35.1	39.9
XII	28.3	22.4
XIV	35.2	35.0
XV	33.1	28.6
XVI	12.1	16.3
XVII	30.0	25.0
XVIII	34.2	16.5
XIX	31.0	40.0
XX	33.1	33.1
XXII	36.9	27.3
XXVIII	29.1	26.3
XXIX	25.9	25.9
XXX	41.4	38.1
XXXI	27.4	21.0
Average	32.91	30.43

The general average of all the sinuses is 31.68 sq. cm., showing a marked uniformity in the two sides. The extremes are head 16 right, 12.1 sq.cm., and head 4 right, 52.3 sq. cm.

From a comparison of the photographs of the various groups of sinuses, and from the actual measurements as recorded, one is struck with the extreme

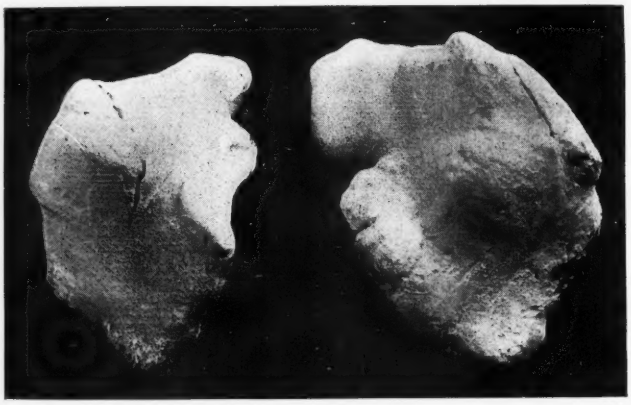
Head XVI. Exact size.

Head XVII. Exact size.

Head XVIII. Exact size.

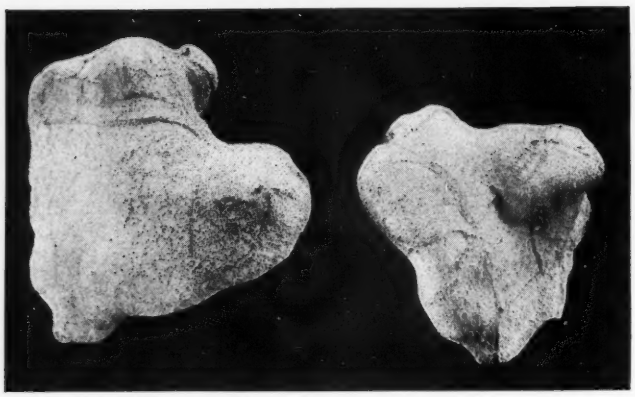
variations in the size and shape of the sinuses in the respective heads. This could not be anticipated from an observation of the heads used before the sinuses were exposed. There seemed to be no connection whatever between the size of the head or contour of the face, and the size or shape of the sinuses.

Very large heads with broad faces often possessed small sinuses, and vice versa. There were no landmarks or signs of any kind which would aid in any way in determining the form or size of the sinuses before they were exposed. No definite reason can be given for this variation in size and shape.



Head XIX. Exact size.

Head XX. Exact size.



Head XXII. Exact size.

The shape of the palatal arch gave no information as to the formation of the sinuses. Heads showing narrow, constricted, high palatal arches where a

narrowing of the sinuses might well be expected, often had very large, or at least the normal size sinuses.

The question is often asked by orthodontists whether or not the expansion of the dental arch affects the size of the maxillary sinus in any way. While my observations were not made with this point in view, I doubt very much whether

Head XXVIII. Exact size.

Head XXIX. Exact size.

Head XXX. Exact size.

this expansion has any effect whatever on the sinus. In most cases the actual increase in size takes place along the midline of the palate and not in the sinus

region. New bone tissue, the formation of which is stimulated by this expansion, is most probably developed along the line of expansion and in the alveolar process.

In making the observations the roots of only a few teeth were found to

Head xxxi. Exact size.

penetrate actually into the sinus. These were principally of the first and second molar teeth. It was not at all uncommon, however, to find only the frailest partition of bone over the apices of teeth. Abscesses of such teeth might easily have affected the sinus.

THE USE OF THE LINGUAL ARCH IN THE TREATMENT OF MALOCCLUSION AS USED BY DR. LLOYD S. LOURIE*

By Martin Dewey, D.D.S., M.D., Kansas City, Mo.

Professor of Dental Anatomy and Orthodontia, Kansas City Dental College; President of The Dewey School of Orthodontia.

IN the first installment* of this series of articles on the use of the lingual arch as employed by Dr. Lourie, I mentioned some of the advantages of the lingual arch in combination with the labial arch as compared with other appliances. In this installment, I will show a number of models of different types of malocclusion, treated with the aid of the lingual arch, which have been taken from Dr. Lourie's practice. The lingual arch has been used on all of these cases either alone or in combination with the modified labial arch. The cases shown are only a few of the large number which he has in his practice and have been selected as typical types of malocclusion with which we all are familiar.

Fig. 1 shows the front view of the model of a patient six years of age, with an underdeveloped upper and lower arch; the lower arch being slightly distal. Fig. 2 shows the occlusal view of the upper arch with a bunching of the deciduous incisors; a lack of development between the upper canines. There is also a crowding of the lower permanent incisors which can be seen in Fig. 1. This

*The Lingual Arch in Combination with the Labial Arch with Extensions as Used by Dr. Lloyd S. Lourie, International Journal of Orthodontia, vol. ii, p. 593.

crowding is the result of the lack of development of the lower arch which in turn is also retarded by the lack of development of the upper arch. The lingual alignment wire was placed on the upper arch, as shown in Fig. 3, with bands upon the deciduous molars. By pinching the lingual alignment wire in the incisal portion, the angles which rest against the deciduous canines were carried away from each other, resulting in expansion in the canine region,

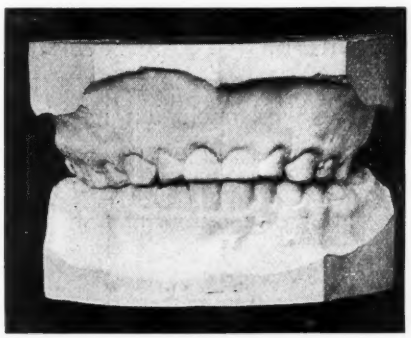


Fig. 1.

Fig. 2.

Fig. 3.

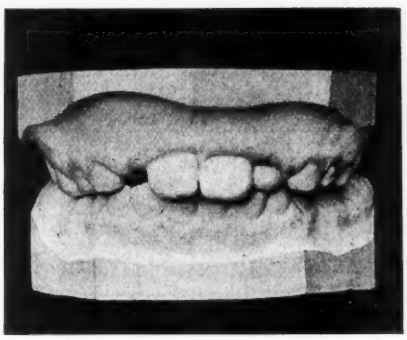


Fig. 4.

which would also cause some expansion of the molars. As the upper dental arch was widened, giving more room for the lower arch, the lower arch grew and the teeth were forced buccally by the action of the tongue assisted by the force of the inclined plane of the lower teeth with the upper permanent and deciduous molars. As the upper arch was expanded, the lower arch developed forward,—the slight distal relation of the lower to the upper molars changed.

Intermaxillary anchorage was at no time employed to shift the molars and no appliances have ever been used on the lower arch. Up to the present time the conditions shown in Fig. 4 have been brought about by the expansion of the upper dental arch with the lingual alignment wire. This work has been done painlessly and without resorting to the use of bands on any of the anterior teeth. The appliance used was absolutely inconspicuous, the bands being carried on the upper second deciduous molars, consequently the appliance was very easy to clean, simple, practical, and esthetic. It may be necessary later in the treatment to put a lingual arch wire on the lower dental arch to assist the growth of the lower dental apparatus. Up to the present time the expansion of the upper arch along with the force of occlusion has been sufficient to carry the case as rapidly as necessary for normal development.

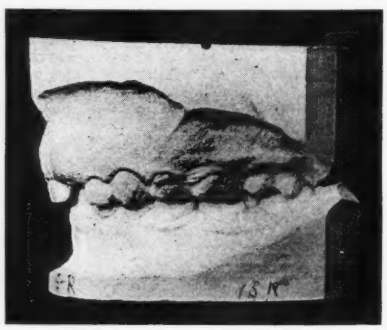


Fig. 5.

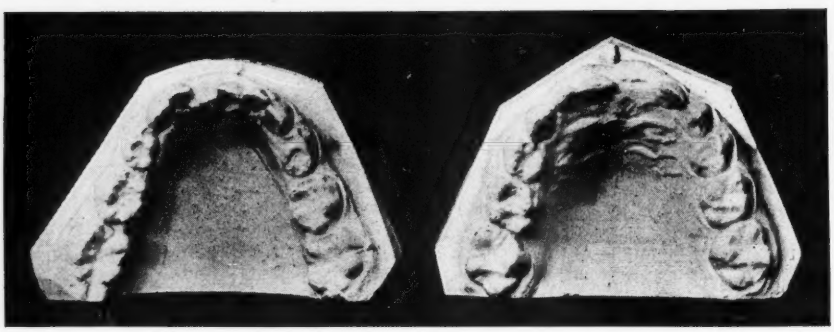


Fig. 6.

Fig. 5 shows a side view of a model of a patient, six years of age, in which there is a distal relation of the lower to the upper arch. Fig. 6 shows the occlusal view of the same case before any treatment was attempted. Fig. 7 shows the occlusal view of the upper and lower models with the appliances in position. It will be seen that the lower appliance consists of a lingual alignment wire, the ends of which are soldered to bands fitted on the lower second deciduous molars. On the buccal surface of the lower molar band is soldered a hook which receives the intermaxillary rubber. On the upper teeth an alignment wire with plain bands placed on the upper first molars is so adjusted that it extends forward practically as far as the deciduous canines. In order to insure a labio-buccal movement of the deciduous canines and prevent them from being pushed forward in the expansion of the lingual alignment wire, spurs

were attached to the main body of the alignment wire, which carried these teeth buccally. These lingual alignment wires are made of 19 gauge iridio-platinum, which material is quite hard and most satisfactory for the use of these appliances where the force is obtained by using wire stretchers. On the upper molar bands we have a buccal tube to which has been soldered an extension which reaches as far forward as the canine, and carries a hook to receive the intermaxillary rubber which will give the necessary force to move the lower arch forward. Fig. 8 shows a buccal extension from the upper molar bands, carrying intermaxillary hooks which supply the intermaxillary anchorage. The upper arch has been expanded, the permanent centrals have assumed their correct position, there is room enough for the upper lateral incisors; and the

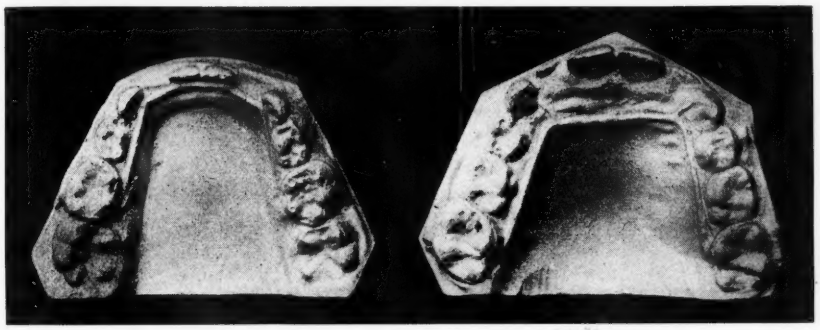


Fig. 7.

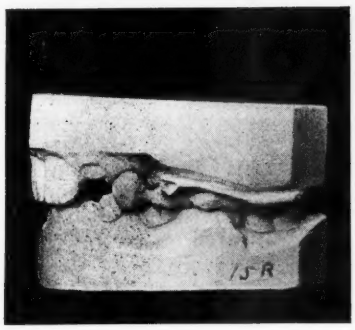


Fig. 8.

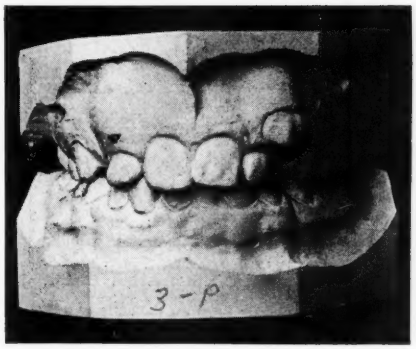


Fig. 9.

mesio-distal relation of the arch is practically established. In the treatment of cases at this age where the lower second deciduous molar remains too long or holds the lower molar distally as it frequently does, Lourie often reduces the mesio-distal diameter of the second deciduous molar to assist the lower first permanent molar in taking its proper position and locking normally with the upper first molar. I think almost every practitioner will agree that the use of the lingual arch as shown in this case is much more esthetic than any described heretofore. The expansion of the upper and lower arch has been accomplished and the mesio-distal relation has been corrected, all with the small lingual arch. As mentioned before, the outstanding feature of this arch is that it is entirely inconspicuous, may be easily kept clean, and no bands or ligatures need be employed on the anterior teeth. It is without doubt the most ideal appliance

for the patient's comfort that has ever been devised. The use of these small lingual arches especially on young patients is very desirable as there are no ligatures to be displaced, no unsightly bands, and the slight amount of pressure exerted by the wire stretchers never causes soreness of the teeth. The patient is never annoyed by the use of the lingual appliance, yet it accomplishes exactly what is expected of any regulating appliance, i.e., exerts enough pressure to produce normal development. Another advantage that might be mentioned is the fact that the patient is extremely well pleased because of the inconspicuousness of this appliance, and it certainly has a wonderful effect upon the parents.

During the last two years much has been written regarding the bodily movement of the teeth, and several appliances have been placed upon the market for that purpose. In considering the apical or bodily movement of the tooth, it must be remembered that anchorage must be more secure than if the tooth was simply tipped. Shortly after various appliances were devised for the bodily movement of the teeth, several articles appeared in the dental journals cautioning those who were trying to produce bodily tooth movement to be

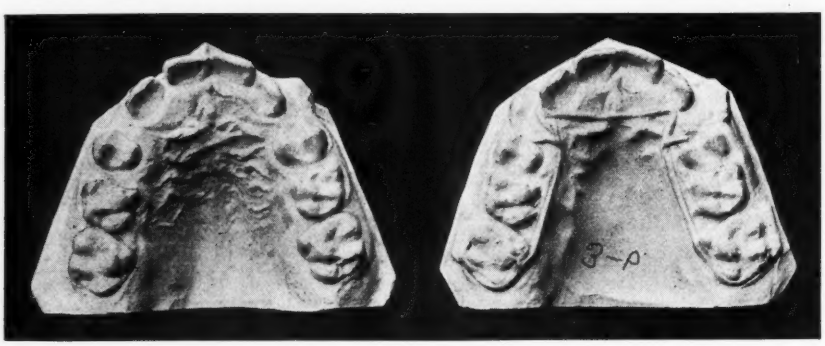


Fig. 10. Fig. 11.

careful of their anchorage. It was evident that orthodontists were experiencing much difficulty in getting sufficient anchorage to produce bodily tooth movement. The use of the lingual arch offers great advantages in molar anchorage when apical movement is accomplished. The lingual arch can be used in combination with the labial arch with the spur attachment for bodily movement of the teeth or the apical movement as shown in the next case reported.

Fig. 9 illustrates a case which required expansion with the apical and torsional movement of the lateral incisors, and distal and lingual movement of the upper canine. Fig. 10 shows the occlusal view of the case. In the occlusal view shown in Fig. 11, we have adjusted on the upper first molar plain bands carrying the buccal tube for a 17 gauge arch. The lingual arch is made of 19 gauge iridio-platinum. The spurs were soldered on the lingual arch to bear against the mesio-lingual angle of the upper premolar for the purpose of moving that particular tooth slightly distal when the upper second deciduous molar was lost. It will be noticed that the lingual arch is bent so as to bear against the lateral incisors which are carried labially as a result of the action of the wire stretchers. I have already stated that these lateral incisors require apical movement.

In the treatment of this case the expansion was produced before any apical movement was accomplished; in other words, no attempt was made to move the teeth apically in the beginning of the treatment, because it is a recognized fact that as a result of orthodontic treatment there occurs a development in the tissue surrounding the roots, and very often the teeth which are supposed to require apical movement, straighten up during the process of treatment. From the foregoing statement I would have the reader understand that when mechanical force is brought to bear upon certain teeth which seem to require apical movement, the tissue development will cause the teeth to assume their proper position in the line of occlusion without any mechanical root movement. It is, therefore, better to begin the treatment of these cases by applying mechanical stimulation and then allow Nature to do what she can. If, in the process of treatment, it is found necessary to have apical movement, the teeth can then be moved just as easily, and Nature will have done what she could.

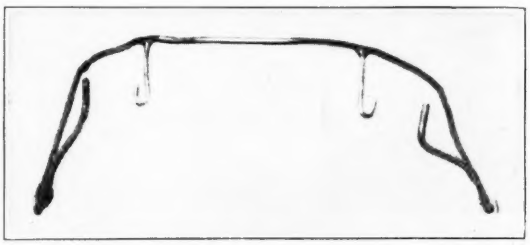


Fig. 12.

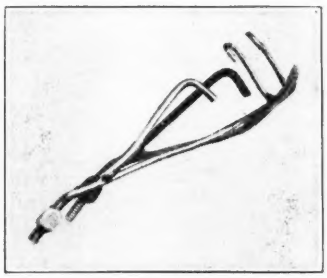


Fig. 13.

Fig. 12 shows a front view of the labial arch. Two spurs with their ends bent to form hooks are attached on the labial arch for the lateral incisors. These hooks are made to engage tubes on the bands which were placed on the lateral incisors for the purpose of rotating the teeth by making the two points of bearing. The labial arch is placed above the gingivus and the spur enters the tube from the occlusal side. This gives a much longer spur, produces a greater amount of elasticity than if it were only a short spur, or an arch placed on the labial surface of the teeth. With the end of the spur bent as a hook and entering the tube from the occlusal side, rotation can be obtained much easier because of the ease of application, plus the long elastic spring of the long spur. Soldered to this labial arch are two extension spurs which also engage two canines for the purpose of moving these canines lingually and distally. By binding these long extension fingers, or springs, force will be brought to bear on the canines and in that manner the direction and degree of movement can be controlled by the expanding and adjusting. We believe that it is of great advantage to have the arches so placed that the long spurs can be used on the lateral incisors (see Fig. 12). In Fig. 13 we have a lateral view of the same appliance as shown in Fig. 12. In discussing this case, Lourie says that at the present time he would use much smaller wire in making the appliance than that used in this case. Fig. 14 illustrates a model of the case which is presented only as a study model and not as a finished result. It shows the manner in which the lateral incisors can be moved and the manner in which the canines can be brought back to their proper position.

In using the lingual arch in combination with the labial arch a great many variations of appliances are employed, the outstanding features of which are their inconspicuousness, esthetic value, and efficiency.

Fig. 15 shows another type of malocclusion treated with the combination of the labial and lingual arches. Plain bands were placed on the upper first molars and the lingual arch was adjusted as shown in Fig. 16. This study model was made during the movement of the teeth and shows considerable movement of the lateral incisors. The lateral incisors were moved forward by pinching the lingual wire on the lateral halves. Small spurs which bear on the linguo-gingival surface of the lateral incisors were soldered to the lingual arch to insure a force directly against the laterals. If, in their movement, the lateral

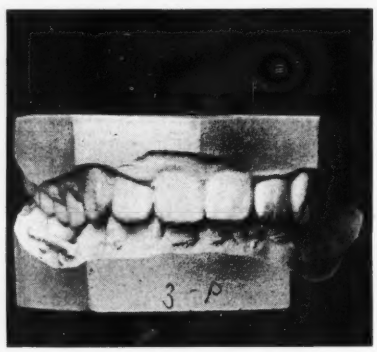


Fig. 14.

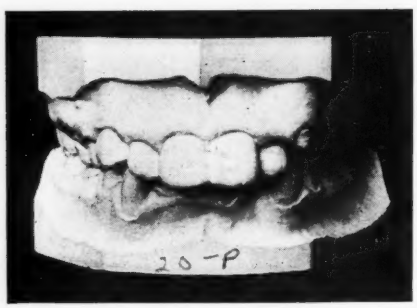


Fig. 15-A.

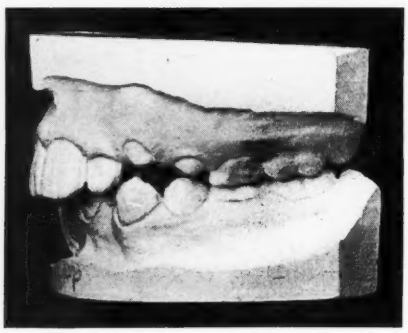


Fig. 15-B.

incisors show a tendency to tip, they can later be straightened by the use of the labial arch in combination with the lingual arch. In this instance, as in most of Lourie's cases, the molar bands, when first placed on the teeth, carry buccal tubes in case it is found necessary to employ the labial arch for a short time during the treatment of the case. Fig. 16 also shows the tip end of the spur extension over the central incisors for the purpose of retracting and intruding these teeth at the time the study model was made. The lower arch was treated by having bands placed on the canines and carrying the labial wire soldered from one canine band to the other. By pinching the labial wire with the wire stretchers the canines were widened as the expansion was required in the canine region; and then by using ligatures, the lateral incisors were brought up to the labial arch. By properly pinching the labial wire soldered to the canine band,

it is possible to rotate these teeth during treatment. Fig. 17 shows the appliance with the labial arch in position with the tube carrying the long lever springs which produce the distal movement of the canine. Figs. 17 and 18 show that there are no extension spurs upon the labial arch during the time the canines are being moved. The advantage of the long spring for the movement of the canine lies in the fact that it is easily adjusted by bending the spring on the canine without disturbing any of the other teeth; in fact, it would have been possible to move the canine at the same time the incisors were moving, and in the adjustment of the spur on the canine there would have been no displace-

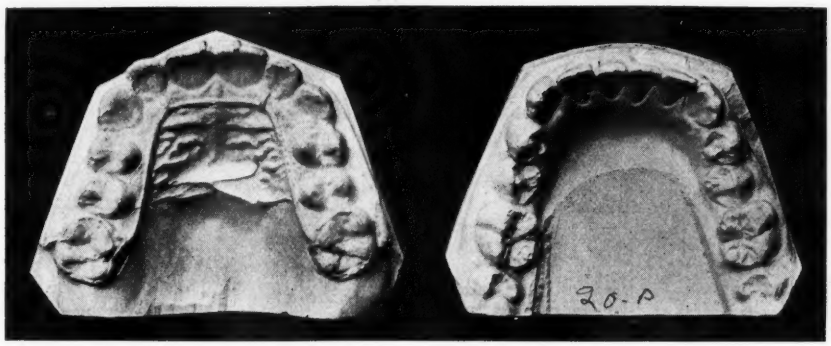


Fig. 16.

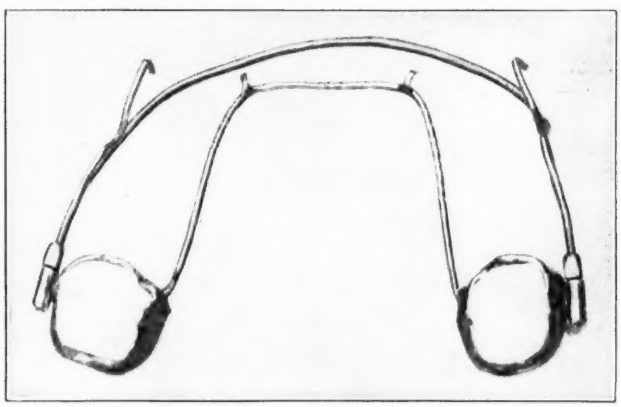


Fig. 17.

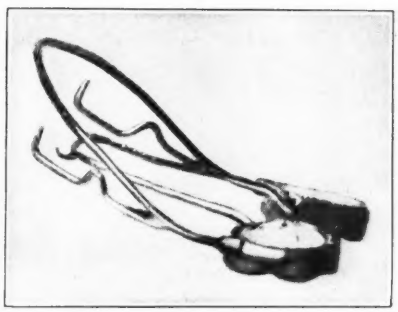


Fig. 18.

ment of the incisors owing to the long spring on the canine. Since the only adjustment necessary was done in the canine spring and as the labial arch was not changed, it was not necessary to disturb any of the other teeth.

Fig. 19 is a front view of the same case made from the study model and shows the position of the spurs on the central incisors for the purpose of producing apical tooth movement. The lingual arch shown in Fig. 16 supports the molars and affords sufficient anchorage for the distal movement of the central incisors. The arch used on this case was 17 gauge, which is smaller than it appears to be on the study model, but it shows the position of the appliance at the time the study model was made. Fig. 20 shows the side view of the study model of the case in the process of treatment. It will be seen that the canine has been brought back to the proper influence of the inclined plane, and the pre-

molars and molars are in their proper positions. It must be remembered that all of this tooth movement has been accomplished with an appliance that is very delicate, and one that is much more pleasing to the eye than some of the bunglesome appliances used for the same purpose.

The use of the lingual and labial arch is not confined to any one type of mal-

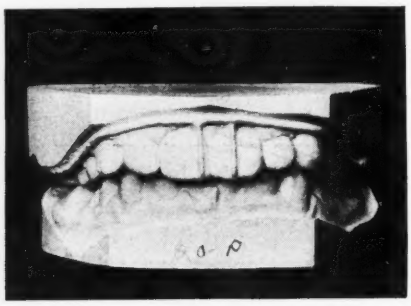


Fig. 19.

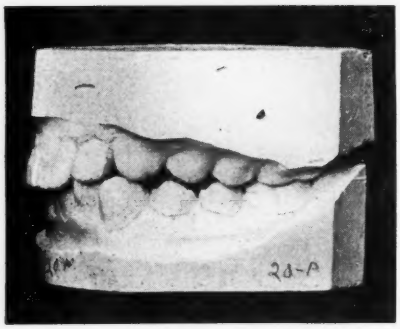


Fig. 20.

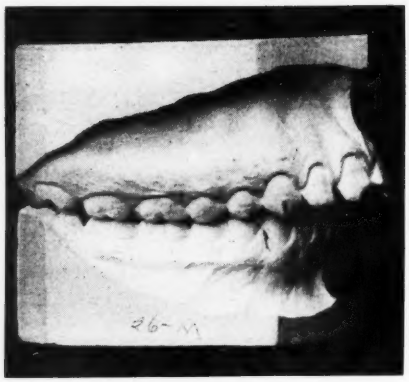


Fig. 21.

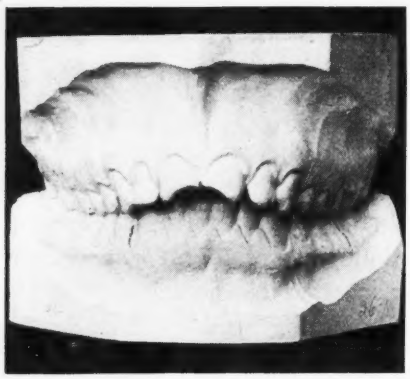


Fig. 22.

occlusion, but may be used in a Class II (distoclusion) or Class III (mesioclusion) case with an equal degree of efficiency as used in Class I (neutroclusion). Fig. 21 shows a side view of a case which requires expansion of the upper and lower arch with distal movement of the upper incisors. Fig. 22, a front view of the same case, shows a narrowing of the upper arch in the re-

gion of the canine. In the treatment of this case, plain bands are placed on the upper first molars which carry buccal tubes as shown in Fig. 23-B. The lingual arch is made of 19 gauge iridio-platinum, and is adjusted so as to rest against the linguo-gingival ridge of the upper canine without touching the upper centrals or laterals. The lingual arch rests slightly occlusal to the gingival marginal ridge, and on the lingual inclined plane of the upper canine; and by bending the lingual arch so as to press gingivally on the canine, it produces an elongating force upon the upper molar. This gives a reciprocal action between

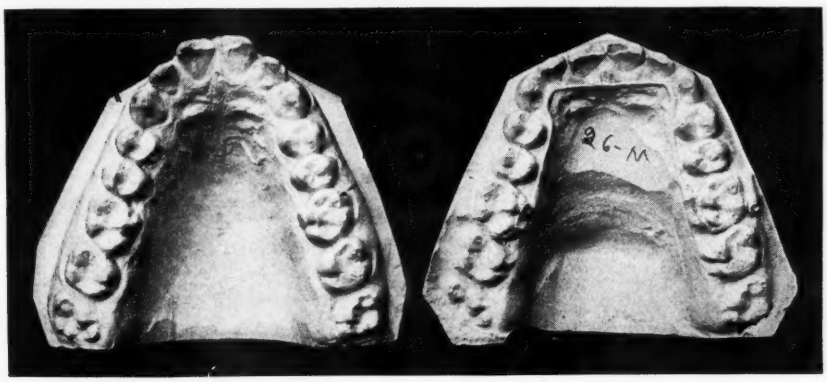


Fig. 23-A. Fig. 23-B.

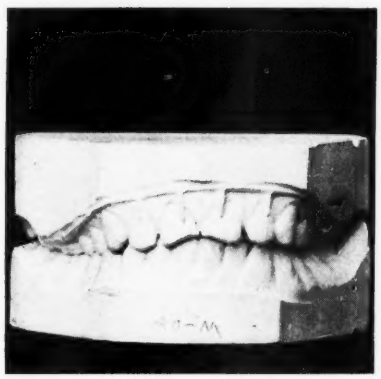


Fig. 24.

Fig. 25.

the expansion of the upper canine, and an elongating of the molars, which, in addition to wire stretching between the canines, produces the necessary tooth movement required in this case.

The lingual arch was adjusted on April 14, 1916, and on April 24 the labial arch was adjusted with extensions to the central incisors, as shown in the accompanying illustrations. On June 21, extension spurs were adjusted on the labial arch for the lateral incisors. The 17 gauge arch was used with 22 gauge extension spurs. The labial arch with extension spurs when placed above the gingivus, gives a very pleasing appearance and an appliance that is inconspicuous. Fig. 24 shows the position of the labial arch with the extension spurs on the centrals and laterals. Fig. 25 shows the change in the mesio-distal relation in the arches, and the change in the angles of the central and

lateral incisors. One of the advantages which I have often mentioned in the use of the lingual arch with the combination of the labial arch and the spur extensions is the pleasing appearance of the appliance, as shown in Fig. 26. These small 22 gauge iridio-platinum spurs running parallel with the long diameter of the teeth are the only parts of the appliance visible, and they touch the teeth only at one point. They are much easier to keep clean than the labial arch resting on the labial surface of the tooth, either with or without the use of the bands.

The lingual arch in combination with the labial arch can be used equally

Fig. 26.

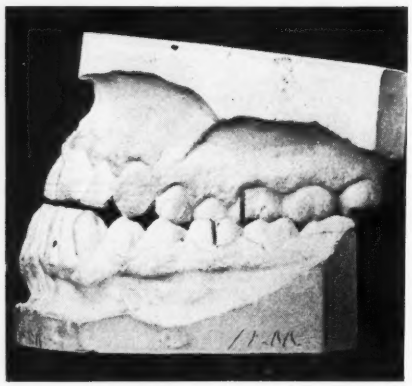


Fig. 27.

as well with intermaxillary rubbers in Class III (mesioclusion) cases or can be used alone with buccal extensions from the lower first molar. Fig. 27 shows a case of mesiooclusion in which the patient has reached that age where she is very sensitive about having a regulating appliance show. The case was treated by adjusting plain bands on the upper first molars and the lingual arch was used, but was made removable, being locked in the lingual tubes by means of a locking device similar to the one known as the Young-Angle Lock. The lower lingual arch is soldered to the lower molar band which also carries a buccal extension (as shown in Fig. 29), to which the intermaxillary rubber is attached from a small hook on the buccal surface of the upper molar band. The

extension of the buccal spur from the lower molar band to the region of the lower first premolar allowed the use of the intermaxillary rubber without any appliance on the anterior teeth that showed from the labial side. The lingual arch used on the upper model was pinched, and produced the expansion necessary; the expansion shown in Figs. 27, 28, 29 was produced by the same 19 gauge lingual arch being used the entire time. The use of this inconspicuous appliance in this mesioclusion case enabled the patient to wear it without being sub-

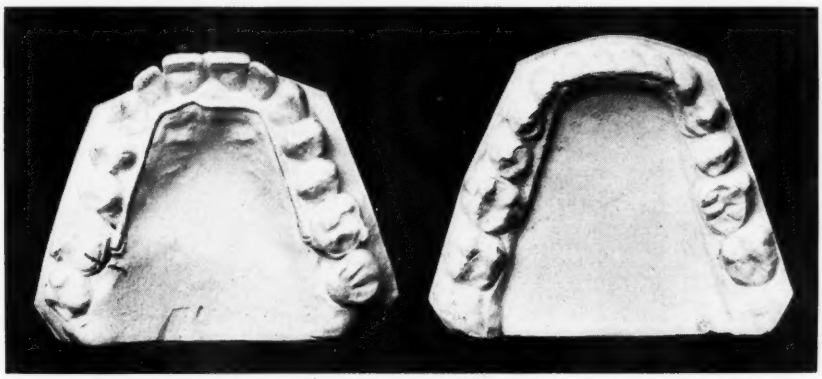


Fig. 28.

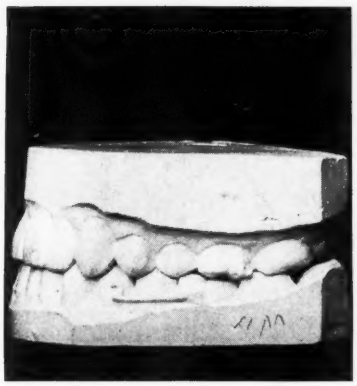


Fig. 29.

jected to embarrassment. I do not believe that any other appliance could have been used which would have been as inconspicuous or of as little annoyance to the patient.

MODIFICATION OF THE LINGUAL AND LABIAL COMBINATION.

The reader should bear in mind that the cases shown in this article are those which have been under treatment, and the study models are presented in order to show the actual appearance or position of the appliance on the case. It must be remembered that an appliance shown on a study model necessarily appears more bulky than it actually is. In using the lingual arch made of 19 gauge iridio-platinum, individual spurs can be soldered to it to bear against the gingival marginal ridge of each tooth. These spurs are bent in such a manner as to be entirely free of the gingival gum tissue, and still the individual spurs can

be pinched by the wire stretchers, thus exerting force on the individual tooth without disturbing the rest of the teeth. By pinching and bending the lingual arch as a whole, various movements can be accomplished on one or both sides. and the molar and premolars can be moved as desired with the lingual arch, as shown in Fig. 30. No spurs are shown upon the premolars, but if desired, they can be made to rest against the lingual surface of the premolars which can then be expanded individually or as a group. The labial arch shown on the study models of the cases reported in this article is a 17 gauge gold and platinum arch which was originally an ordinary expansion arch with screw and nut attachments. As there is little use for the nut and screw, the labial arch as

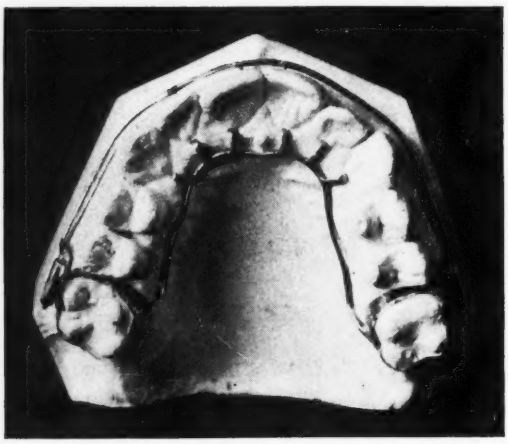


Fig. 30.

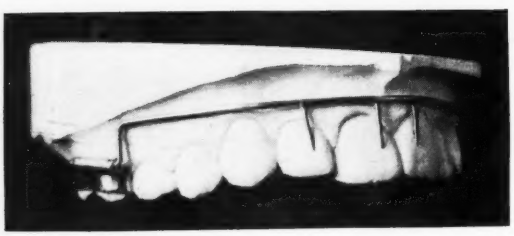


Fig. 31.

now used by Lourie, consists simply of a 19 gauge iridio-platinum wire carrying 22 gauge gold and platinum spur extensions. Gold and platinum spurs of 22 gauge are used because this material possesses a greater elasticity or spring than iridio-platinum. The labial arch is bent gingivally, mesial to the buccal tube with the result that the entire labial arch lies high on the gingivus (as shown in Fig. 31) with much less annoyance to the patient in that position than an arch that rests on the gingival border of the teeth. These improvements and changes make the appliance practically inconspicuous, as shown in Fig. 26.

The advantages of this appliance, from an esthetic standpoint and also from the point of cleanliness for the patient, surely causes it to more nearly fulfill the ideal conditions of a regulating appliance than anything we have had heretofore. Yet with all its advantages, this appliance must be prop-

erly manipulated in order to secure the best results, and the operator who desires to use it should be absolute master of the mechanics of bending and stretching the wire in various directions and the effects of the spring should be thoroughly understood, or it will be as troublesome as it can be made useful. However, the ease with which patients wear these appliances, and the source of satisfaction that patients who have worn other appliances derive from them, is certainly a strong recommendation of their practicability.

THE PRACTICAL USE OF TUNGSTEN AND MOLYBDENUM IN ORTHODONTIC APPLIANCES.

By H. C. Pollock, D.D.S., St. Louis.

AMONG the orthodontic appliances in use at the present time, there is one usually referred to as the expansion arch, or, as some operators prefer to designate it, the alignment wire, which has assumed an important role in orthodontic equipment. It still possesses some very valuable advantages in the treatment of malocclusion and seems to retain its popularity.

Within the last few years, we have had several modifications of the expansion arch advocated, and appliances based upon entirely different scientific principles have taken their places in orthodontic technic, however it still remains that the combination of force,—the jackscrew combined with spring energy as exemplified in the expansion arch—enjoys a very prominent place in most orthodontic practices.

Expansion arches, in the past, in order to meet their requirements, have been for the most part made of German silver together with its various combinations of alloys. It has probably been used more extensively than any other material for such purposes. Some of the advantages claimed for the base metal arch may be mentioned as follows:

1. That it is capable of being tempered to the point which will enable it to exert the desired amount of elasticity; that its efforts to release itself like a coiled spring, when adapted to the teeth, may be controlled by tempering or releasing its temper as is indicated during treatment.

2. That this base metal material exerts an antiseptic influence at the points where it comes in contact with the tooth structure, and this feature in many instances serves as a protection to the tooth, whereas, if a noble metal were used, caries might gain favorable access. Together with its advantages, there are so many disadvantages in connection with the use of base metal as an expansion arch, that to say the least, any material which will adequately meet all the requirements of an arch and eliminate the undesirable features of base metal, is to be desired. Some of the more conspicuous objections to German silver and its alloys as an arch material might be here pointed out. The gold plating with which these appliances are usually plated, soon vanishes when in practical use; the appliance oxidizes and exposes a surface which is not only unsightly in appearance, but is decidedly offensive from an esthetic standpoint.

3. Soft solder must be used for the attachments placed upon this mate-

rial for a Baker anchorage or for spurs, because the temperature required to fuse a higher grade of solder entirely releases the spring energy of the arch.

4. We have some base metal appliances on the market which are made of brass, pure and simple, being gold plated; and the objections to brass to be used in the mouth are only too obvious to be worthy of further comment.

Various forms of precious metals are used quite extensively, among which may be mentioned platinum and gold, including various alloys of these metals, also alloys of platinum and iridium. These possess many advantages over the base metals, among which are those of presenting a better esthetic appearance, and they may be used in smaller gauges which allow them to retain their rigidity. Attachments may be secured to the noble metal appliances with gold solder without working injury to their rigidity; nevertheless, these precious metal arches in practical use must also come in for their share of criticism. In some mouths it is claimed precious metal appliances of gold and platinum discolor; that the same being in contact with tooth structure for a long period of time and having no antiseptic qualities encourage decay and discoloration of the teeth. It seems to be very difficult to draw platinum and gold alloy wire down to the small gauge which is desired for delicacy and appearance, and at the same time to retain the rigidity which is so essential and without which any arch no matter of what material constructed, used as an alignment wire, is utterly inadequate, and usually proves a failure in practical use. The basic principles of an expansion arch to be used for moving teeth are rigidity and elasticity, and when utilizing the principles of tooth movement which require attachments of flexible ligature to the teeth to be moved, the above requirements are most essential; and the writer believes that the metal tungsten drawn down to wire form more nearly answers these requirements with less bulk than does any other material that we have at the present time. The use of tungsten and molybdenum as orthodontic appliances was first advocated by Weston A. Price, D.D.S., and Frank A. Fahrenwald, E.M., after some very complete research by the Scientific Foundation and Research Commission of the National Dental Association, the report of which work points out some very interesting attributes of these metals.

After having used tungsten and molybdenum for a considerable time in practical clinical work, the writer believes the former to be far superior for various forms of expansion arches than any metal which has previously been used for the purpose, as it manifests some desirable characteristics which no other metal offers in practical use.

The elastic content of tungsten being about twice that of steel, its melting point nearly twice that of platinum, its stiffness about six times that of 30% iridium in platinum, also the quality that it does not anneal or lose its stiffness and elasticity at tremendous heat, makes it particularly adaptable for some of the uses of the orthodontist.

The elasticity and the rigidity of tungsten is so great that, used as an ordinary expansion arch, the gauge may be reduced as low as .022; however, with a diameter of .030 (about 21 gauge) it manifests ample elasticity for correcting most cases of malocclusion, in fact, exerts as much "kick" as does iridioplatinum, gold alloy, or German silver of much heavier gauges and sizes. The

color is an ebony black. In the mouth, however, tungsten first plated with palladium, and then with gold, as advocated by the Research Commission, has been found to be much more satisfactory and pleasing in appearance. The latter solders successfully with gold solder, pure gold, or silver solder, and as a result, there is no discoloration or oxidization of the appliances at any point. Of course, as was pointed out above, the temperature which these solders require, affect at no point the rigidity or elasticity of the wire. Solders do not attach to either tungsten or molybdenum without plating because these metals oxidize at high temperatures when exposed to the atmosphere; however, it serves its pur-

Fig. 1.—Pliers designed by Dr. M. N. Federspiel, used in making loops in the metal molybdenum wire.

Fig. 2.—Pliers used for bending tungsten wire. Sharp angles should be ground out of the beaks

pose best, from an orthodontic point of view, to be gold, or gold and palladium plated. Tungsten takes a palladium plate under favorable conditions, also palladium and gold in combination. The fusing point of the resulting plate is above that of pure gold. This metal used with the palladium plate has the color of platinum and will retain this color indefinitely in the mouth. It is affected by no chemical action or discoloration; and with ordinary prophylactic care in the mouth, palladium plated tungsten has the appearance of iridio-platinum, will solder with any karat gold solder, and from an esthetic standpoint, this material has only one peer and that is the combination of gold and palladium plated tungsten. When plated with this latter combination, it has the color of

pure gold, which color it will retain indefinitely in the mouth, and further is not affected by oral fluids or food debris.

The material can not be soldered end to end, but the plated surfaces can be joined successfully by solder. These plated surfaces, however, when well joined, seem to give the whole piece the appearance of being securely soldered as would be two bare pieces of iridio-platinum fused with pure gold. The solder should extend over a considerable area. When two of the surfaces do fail to adhere, it is usually due to the fact that the plating has pulled away from the tungsten, carrying the solder with it.

The use of tungsten in conjunction with Varney Barnes's tubes (Fig. 4) for buccal attachments, in the writer's practice, has proved thoroughly adequate to meet all requirements where a base metal is utterly unable to qualify, but at the same time possesses all the merits of the commonly used, and also advocated, precious metals. It offers advantages which can not be supplied by either of the above combinations of materials.

Fig. 3.—Showing tungsten arch adapted to the teeth.

While tungsten is very elastic, it exhibits certain physical characteristics which require more or less of a familiarity with its properties in order to handle it successfully. It is so hard and dense that it cannot be filed or cut with the wire nippers, but must be cut or etched with a knife-edge stone, then quickly broken as is done with glass. If tungsten wire is broken without etching, it will splinter as in the case of a piece of green wood. Care must be exercised in adapting or bending the wire to conform with the surfaces of the teeth, for, if bent too sharply, it will break. The writer has secured a special form of pliers for this purpose (Fig. 2) an instrument used by opticians for bending the nose piece of eye glasses. All the sharp edges of the beak of this plier are carefully ground away in order to eliminate any sharp edges which might come in contact with the tungsten while it is being bent, the idea being to secure a long even bend of the wire rather than a sharp quick one. It is also rather hazardous to attempt to bend the wire at a point where solder has been flowed, as the foreign influence of the solder predisposes to a fracture of the material if an effort is made to bend it at this point.

A tungsten wire .030 in conjunction with Varney Barnes's tubes, adapted close to the teeth, also close to the gingival margin, with the elimination of all bands, serves as the most effective, satisfactory, delicate, and esthetic appliance which it has been the writer's experience to use. If it is not desired to use the buccal tubes above referred to, the squared-end sections manufactured for the Angle pin and tube appliances may be used and soldered to the ends of the

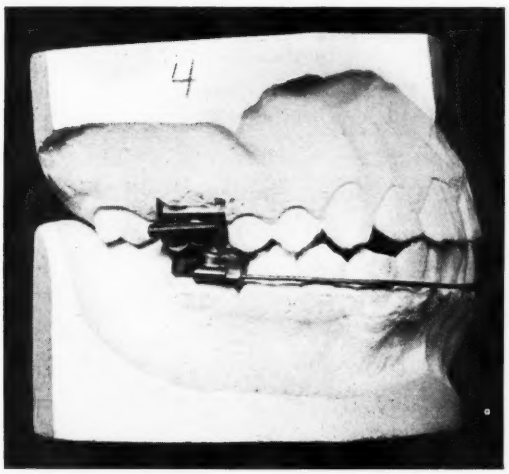


Fig. 4.—Photograph showing tungsten arch adjusted to cast, using Varney Barnes tube for buccal attachment.

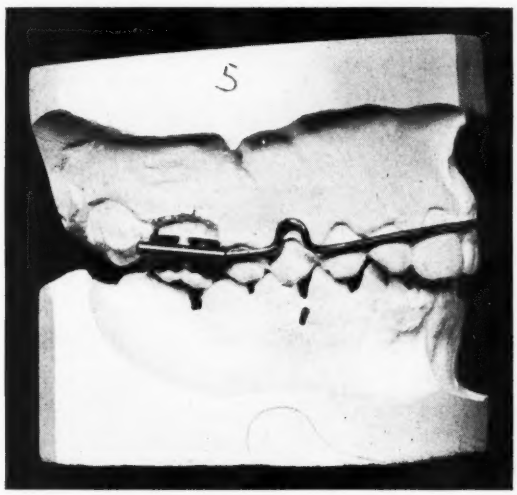


Fig. 5.—Showing molybdenum arch adjusted to cast, using loops for mesio-distal adjustment.

tungsten wire. By carefully adapting this metal and placing the arches high, well above the gingival margin, the same effect may be produced mechanically, that is, obtained with any other form of arch, but particularly with the added advantage of much more sightly appliances, and in the majority of cases quite inconspicuous and delicate. (Fig. 4.)

Its very large factor of strength in small gauges also makes it particularly adaptable for use in the various combinations of retaining devices, possessing ample strength to withstand the stresses of mastication. Another added ad-

vantage in retaining appliances may be secured by adjusting the retainer, from time to time, to produce any further shifting or fixing of the teeth which may be desired. Attachments may be made to the individual tooth, which attachment are flexible and allow the teeth to respond to the forces of occlusion; but as the tungsten is strong, it still retains ample rigidity, and without the fixed soldered attachments to the retaining bands. In the report of the Research Commission on tungsten and molybdenum, some further qualities of these metals are pointed out: "Tungsten has a hardness so great (so we are informed by the General Electric Co.) that a specially prepared phonographic needle point from it will outwear two hundred steel points; will draw to a finer wire than any known metal; has a tensile strength thirty times that of gold and ten times that of iron; is not affected by ordinary acids or alkalies, except hydrogen dioxide, in which it is soluble. Its melting point is over 3.000 degrees C. or 5.400 degrees F., and is from six to seven times as stiff as iridio-platinum." The prop-

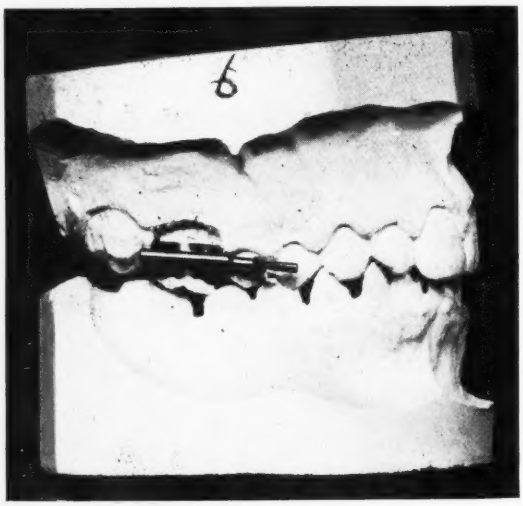


Fig. 6.—End section of Angle pin tube appliance, to which may be soldered tungsten wire.

erties of the coated material as reported by F. A. Fahrenwald indicates that it has the surface properties of pure gold or its alloys, together with the original properties of pure tungsten, a combination which can not be approached by any other metal or alloy at the present time available.

This is because of the great strength and stiffness of the new material and due to the fact it can be soldered or otherwise manipulated at high temperatures without softening or losing this stiffness and elasticity in the slightest degree, however, there can be some treacherous spots still found in the coated tungsten wire.

The chief objections to this material are its brittleness and unreliability in the larger sizes, but this objection is gradually being remedied in the experimental department of the Research Commission of the National Dental Association.

Molybdenum is quite satisfactory to be used in conjunction with the loop appliances, which has been described and advocated by Dewey and others. Fig. 5 shows a molybdenum arch wire in place having two loops placed in it at such

points that it may be adjusted from time to time by the bending and manipulation of these loops being used in conjunction with the well known Young attachment on the molar bands, or the attachment seen in the cut. This form of attachment on the anchor bands facilitates ease and convenience in making adjustments, as the arch can be very quickly removed and all manipulating done when detached from its anchorage. By using the pliers as illustrated in Fig. 1, designed particularly for this purpose by Federspiel, the loops are quickly and accurately made. Molybdenum bends easily, yet it is sufficiently rigid to retain its position under the stress of mastication.

The price of gold or gold and palladium plated tungsten is about one-fifth that of platinum, or one-sixth that of iridio-platinum. The price of molybdenum gold or gold and palladium coated is about one-eighth that of platinum or one-half that of iridio-platinum. The materials, tungsten, and molybdenum for use in the newer forms of appliances, which control the bodily movement of teeth, have in the writer's experience proved thoroughly adequate only as a working retainer. In this latter capacity, tungsten has proved, in a few cases, quite effective, as its rigidity allows no flexing backward and forward of the roots of the teeth. It has been used to great advantage in the retention of Class II, Division 1 cases, where it has been desired to move the lower incisors bodily in the labial direction, advancing the labial plate of compact bone *en masse*.

Fig. 3 shows a tungsten arch in position to be used in conjunction with a Baker anchorage for shifting the occlusion.

The above outlines the advantages and the conclusions reached by the writer upon the relative merits of these metals used for orthodontic purposes through an experimental stage of a considerable length of time and as such, experience convinces him that these materials solve some of the many difficulties in treatment. No doubt, the experience of others will develop some very desirable and welcome ideas in the use of tungsten and molybdenum, which, as yet, are obscure but offer great possibilities of development in future orthodontic technic.

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Dewey, Martin: Practical Orthodontia, St. Louis, 1915.

American Institute of Dental Teachers

THE next annual meeting of the American Institute of Dental Teachers will be held at Hotel Adelphi, Philadelphia, Pa., January 23, 24, 25, 1917.

A number of papers, reports and discussions relating especially to dental education will mark this meeting. All dental teachers are cordially invited to be present.

ABRAM HOFFMAN, Secretary.

529 Franklin Street, Buffalo, N. Y.

THE DEVELOPMENT OF THE MANDIBLE AS A RESULT OF TREATMENT OF THE PROTRUDING UPPER INCISORS AND DISTOCLUSION OF THE ARCH

By W. A. McCarter, D.D.S., Topeka, Kansas.

THERE are two types of malocclusion which cause a very similar facial deformity, one being distal occlusion of the lower arch, or Class II, Division 1, and the other neutroclusion, with an underdeveloped mandible and protruding upper incisors. The etiological factors of either one of the cases are very much the same, as mouth breathing has probably been the principal cause of these types of malocclusion, with the resulting facial deformity. The treatment of these cases is decidedly different so far as handling of the parts is concerned; however, the thing to be desired in both cases is the development of the mandible.

There has been considerable dispute whether an actual lengthening of the mandible can be produced as a result of the treatment of the malocclusion, and in presenting this case, we do so to add to the evidence we should gather in the consideration of this question. There has been some claim that in the treatment of distoclusion the seeming lengthening of the mandible which we accomplish as a finished result, has been caused by the movement of the condyle forward in the glenoid fossa and is not produced by the development of the body of the mandible. In these neutroclusion cases where the mandible is underdeveloped there is no attempt made to move the mandible forward which could easily be detected by changing the position of the molars; therefore, what lengthening of the mandible occurs as a result of orthodontic treatment is produced by the growth of the body of the mandible from the ramus to the point of the chin.

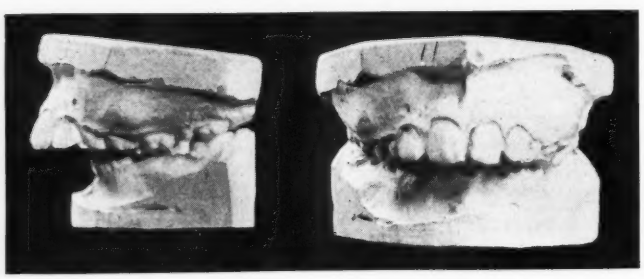

Fig. 1.

Fig. 1 gives a front and side view of the model, showing that the upper arch is very narrow, that the upper incisors are lengthening and protruding, and that the length of the lower incisors is very marked. There is no abnormal mesio-distal relation of the molars, which indicates that there is neutroclusion of the two arches, with an underdeveloped mandible and protruding upper incisors. It will be seen that there is a great difference in the length of these two arches, as shown in Fig. 2.

The patient, a boy, was eleven and a half years of age at the time the impression was taken, showing a lack of proper nourishment as a result of the malocclusion, making it impossible for him to masticate his food properly. In the treatment of this case, the clamp bands were placed on the upper and lower first molars. The alignment wire was adjusted to the upper teeth, the anterior portion resting against the upper incisors. The lower alignment wire was adjusted to the anterior teeth. An intermaxillary rubber was used and extended from an intermaxillary hook on the upper alignment wire about the region of the canine to the distal portion of the tube on the lower band. The intermaxillary rubber was used to accomplish two purposes; first, its attachment to the upper anterior teeth was to reduce the protrusion of these teeth, and second, it was employed to move the lower arch forward.

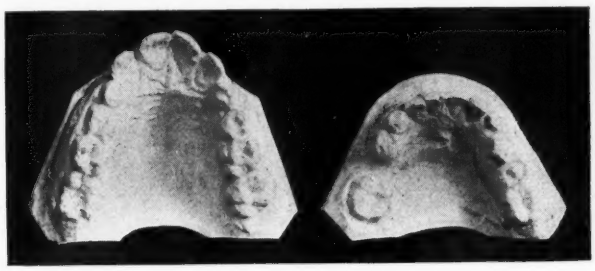

Fig. 2.

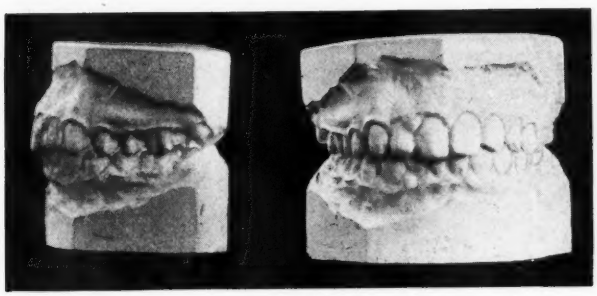

Fig. 3.

Fig. 3 shows a front and side view of the model of the same case after treatment. This impression was taken when the arches were removed and the retaining appliances adjusted. The retaining appliance is applied only on the lower arch as the occlusion and normal lip pressure was sufficient to keep the upper teeth in their proper position.

Fig. 4 shows a front and side view of the patient at the time of the completion of the treatment. This picture is unique in that the front and side views of the patient are photographed on the same plate at the same time by the use of a large mirror. The patient is so placed that he faces the camera and the mirror is so placed that the reflection of the profile is shown in the mirror in such a manner as to be transmitted to the photographic plate, as shown in Fig. 4. This method of taking photographs makes only one exposure necessary and is much more convenient in making a lantern slide than where we have a separate profile and a front view to be made on one side. It also insures that the

profile and the front views will be uniform in size. There is also an advantage in making a case record by this method, for both the front and side view are on one picture, and consequently we have only half as many pictures to look after as would be the case when the front and side views are on different negatives. By studying this case it will be seen that the mandible has been lengthened as a result of the orthodontic treatment, much more than the forward movement of the lower molars and cannot be the result of the mandible changing in the glenoid fossa.

THE REPORT OF A DISTOCLUSION CASE WITH AN UNIQUE METHOD OF PHOTOGRAPHING THE MODELS.

The case shown in Fig. 5 is that of distoclusion or Class II, with protruding upper incisors and abnormal lip action. As a result of the abnormal

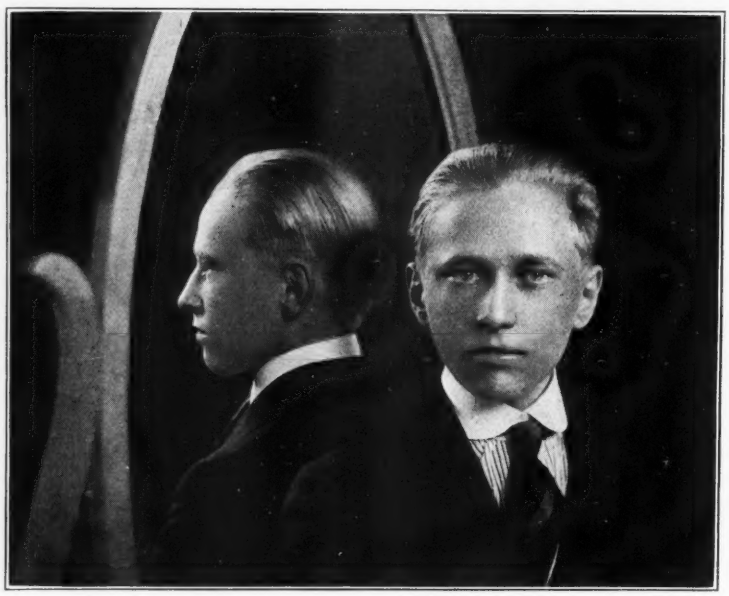

Fig. 4.—Showing an unique method of photographing the front and side view of the patient on the same plate at the same time by the use of a large mirror.

action of the lips, the upper central incisors have been separated for a considerable distance and the teeth are made prominent by the pressure of the lower lip. This case was treated by the use of the clamp bands upon the first molars and ordinary alignment wires. The upper alignment wire was applied with the anterior portion of the wire resting against the upper incisors and the nut standing away from the tube on the upper molar bands. The lower alignment wire was adjusted to the anterior teeth in the lower arch for the purpose of moving the lower arch forward *en masse* without destroying the proximal contact of the teeth or allowing very much tipping of the incisors. At the time the intermaxillary rubbers were applied, ligatures were also placed on the premolars and canines for the purpose of expanding the upper arch as the upper anterior teeth were moved posteriorly by the action of the intermaxillary rubbers. As the upper canines and premolars were expanded

the upper incisors were moved distally or posteriorly and when they occupied the proper position so as to make the upper dental arch a normal shaped arch the nuts were then screwed distally on the upper alignment wire and rested against the anterior portion of the tube on the molar band. This makes all the upper teeth serve as anchorage against the lower teeth which were being moved

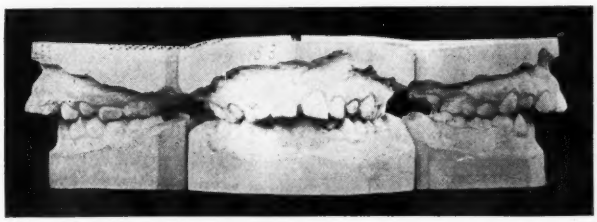

Fig. 5.

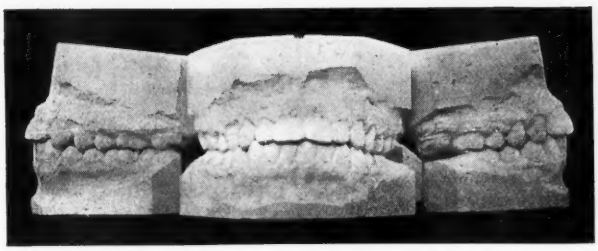

Fig. 6.

forward by the action of the intermaxillary rubbers. The use of the intermaxillary rubber continued to move the lower teeth forward until they assumed the position shown in Fig. 6, at which point they were retained. The case was retained by the use of the intermaxillary retention described under the treatment of Class II, Division 1, cases in Dewey's "Practical Orthodontia."

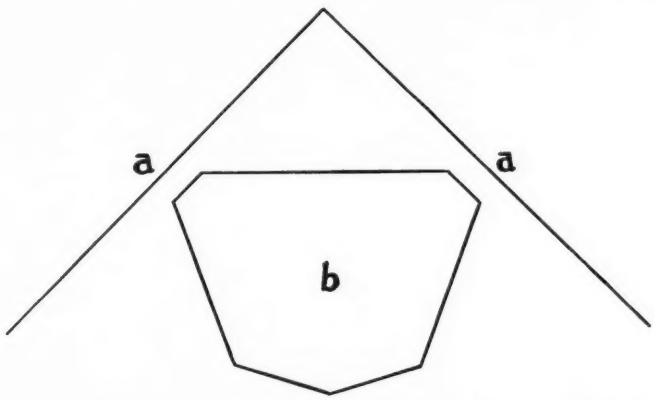

Fig. 7.—*a*, position of mirrors set at right angles to each other; *b*, model facing camera.

Figs. 5 and 6 were made by photographing the models with the use of two mirrors. The model is set with the front facing the camera and behind the model two mirrors are placed which join together at right angles as shown in Fig. 7. The reflection from the mirrors makes the image appear in the camera a double profile view as shown in Figs. 5 and 6. In experimenting

with this form of photographing I have secured the best results with cheap mirrors. Plate glass mirrors seem to throw a halo around the model. Whether this has been the fault of the mirror or has been due to faulty negatives I do not know; however, my experience has been in favor of the cheap mirrors. This method of photographing three models on one plate by a single exposure with the models arranged as in Figs 5 and 6 is especially a good time saver if lantern slides of the case are to be made. The photographs from which the cuts are made are probably too small but they were made this size so that the lantern slides could be made by contrast. If the photographs were made on a larger plate, they would have to be reduced in the making of the lantern slides, which could be done easily enough with the use of the lantern slide or enlarging camera.

This technic in photographing was first shown before the 1916 meeting of the American Society of Orthodontists in Pittsburgh and I believe it will be found a great time saver for orthodontists who are taking their own photographs. It will be a great financial saving for those men who are having their work done by commercial photographers. With a little time and by learning the technic, any one will be able to take photographs of the patient and of his model as is shown in this case and the case previously reported.

NORMAN GREENE REOCH, D.M.D.

By Mark D. Littig, D.D.S., M.D., and Frederick A. Keys, D.M.D.

"The hand of the reaper
Takes the ears that are hoary,
But the voice of the weeper
Wails manhood in glory."

"The autumn winds rushing
Waft the leaves that are serest,
But our flower was in flushing
When blighting was nearest."

—Scott.

"ON Thursday, May 5th, at 10 o'clock P. M., Doctor Norman Reoch died." Such was the message that shocked and grieved his friends on the following morning. Blessed with a rugged constitution and enjoying the best of health, the suddenness of his death remains a mournful mystery to his hosts of friends.

Doctor Norman Green Reoch was born at Riverpoint, in the town of West Warwick, Rhode Island, on October 20, 1879. He was the second youngest of a family of five boys and three girls. His mother's name was Helen Stewart, and his father's name Robert Reoch. Both father and mother came from Burrhead, a large industrial town about seven miles west of the City of Glasgow, Scotland.

At five years of age Norman was sent to a private kindergarten school,

where he remained for three years. In his eighth year he attended the Phenix Grammar School, where he remained for three years. In 1890 in his eleventh year he entered the English and Classical School in the City of Providence, spending three years in the Junior and four years in the Senior department. He graduated with high honors from this institution in 1897. In the fall of this same year he entered Harvard Dental College, graduating in 1901. He was the youngest graduate in his class. Doctor Walter Kenyon of Providence, the family dentist, strongly urged his father to train him as a specialist. As a result Dr. Reoch entered upon a course of orthodontia under Doctor Angle in St. Louis. He remained in St. Louis two years, the second year as Doctor Angle's assistant. He also spent some time in Chicago and Detroit at Doctor Angle's suggestion, to obtain some knowledge of office practice and routine. In the fall of 1900, in his twenty-fourth year, he opened offices in Warren Chambers, Boston, where he remained till his death. Soon after starting to practice in Boston he became an assistant instructor in Harvard Dental College, which position he retained for several years. He was connected with the Forsythe Infirmary as "Consulting Orthodontist."

From childhood Doctor Reoch was a lovable boy, a favorite with his playmates and school companions, generous and unselfish in the extreme, and these characteristics remained with him all through life. He was the possessor of a pleasing personality which gained him friends wherever he went. He was naturally unobtrusive, and though possessed of talents much beyond the average, he shunned rather than sought notoriety, never cared to push himself forward or felt "puffed up" with pride on account of his attainments, and would invariably stand aside and give way to others, rather than attempt to stand in the way of their preferment.

Among other memoirs contributed by his father is the interesting fact that he had a natural gift for drawing, which was quite remarkable, and when only a boy entering his teens produced some landscape scenes in crayon work which were most creditable. The only lessons he ever received in drawing were obtained from the village barber, who also had a natural taste for drawing and painting, which was wholly self-acquired. At the Kent County Agricultural Fair in Rhode Island, Norman in his thirteenth year, took first prize in a drawing competition for children under sixteen years of age. In the following year at the Rhode Island State Fair he also took first prize. The picture he exhibited on this occasion was a pastel representing a woodland scene. These two pictures are framed and adorn the walls of his father's home today.

When about eight years of age Norman began the study of the violin, and soon developed a wonderful aptitude for that instrument. When he entered Harvard in 1897 he was a very proficient violinist. While in college he became a member of and played first violin in the Pierian Sodality, the largest musical club of the college.

Norman was always fond of athletic sports of all kinds, and particularly fond of swimming. This led to a sad episode in his career while at Harvard. He and his roommate at college, Mr. Joseph W. Smith, of Andover, a young man of great promise, went off on a canoeing trip in Maine during their vaca-

tion in the summer of 1900. All went well until their return trip on the Bay of Naples, when a sudden squall struck them, and capsized the canoe with all their camp equipment, etc. The two young men at first strove to save all the floating wreckage, but squall after squall struck them, separating them far apart from the upturned canoe, and in this plight Smith was seized with cramps and disappeared. Norman was rescued in an exhausted condition, but young Smith was drowned. It is interesting to note that Mr. Reoch thought that this sad experience would surely cure his son Norman of his extreme fondness for the water, this being his third rescue from drowning, and it was often remarked at home that in whatever way his death was destined to take place it was evidently not to be by drowning; yet after all, Norman's love of the water was without doubt the indirect cause of his untimely death.

On the afternoon of his death Doctor Reoch found recreation in cutting the lawn of his Winthrop home. The warm weather moved him to follow the strenuous exercise by a swim in the ocean. The cold water caused him to experience some discomfort, but to a man of his physique and excellent health this seemed of no consequence. He motored to the city, spent an hour in his office (completing several retaining appliances for children who were leaving for the summer), and left the building at eight o'clock in his usual happy mood and apparently in the best of health. Returning to his home he played with his little nephew and his pet dog, bade his wife good night, and retired. But before he could have passed into the refreshing sleep of night he passed into that sleep from which there is no awakening. His splendid physical condition saved him from death in the ocean, but death came to him in sleep, without warning to himself, to his family or to his friends. Could we who knew him, we who respected and loved him, we who know his virtues and his accomplishments, we who have had the privilege of his friendship, experience a greater shock? Well do we remember his return to Boston, at a time when Orthodontia was not recognized as a specialty. He received no encouragement in his intention to specialize, but he "promised Doctor Angle that he would practice orthodontia as a specialty," and he kept his promise. He became one of Boston's first orthodontists. He had a large and lucrative practice—a practice of children who loved him, children whose appreciative parents believed in him and in his ability. He had the respect and confidence of his professional brethren. He was a member of many dental societies, among which are Massachusetts and National Dental Associations, Harvard Dental Alumni Association, Harvard Odontological, American Society of Orthodontists, etc. As a teacher he was a student with students, always courteous and ever willing to impart what he could of his unlimited knowledge of his favorite subject. And the student who could be in Doctor Reoch's class considered himself fortunate. He had a happy home and a loving wife (formerly Miss Helen Baker) whom he married October 6, 1915. He loved animals as he loved children; he loved nature, the woods, the hills, the streams, and he loved the ocean—and the ocean caused his death.

He was buried from his father's home in Phenix, Rhode Island, on May 29th. He left behind him his family, his little patients, and a host of friends to mourn: but the world is a better world because Norman Reoch lived.

IS FACIAL DEVELOPMENT AN INDEX TO CHARACTER?

By Edward L. Mitchell, D.D.S., Indianapolis, Ind.

FOR ages past the human family have labored under a fallacy that heredity was responsible for almost everything in man, from the minutest physical development to that of his intellect, mind and soul. The phrenologist has pictured life from the developmental bumps. The physiognomist portrays a man's character and life from the face, blaming nature for certain conditions, and depicting in it all his strength and weaknesses, painting a prophetic portrait of his real life and possibilities, but always forgetting that we are human and bend to suit certain conditions of environment almost as soon as we are born into the world. The man with a square, prominent chin has been credited with an undue amount of determination, while a lack of development of the same has been significant of natural weakness.

Why have these ideas predominated with never a thought as to why each developed in such proportions? We know that these conditions have no place in the normal, natural man; then how could they be of such significance? Early correct the conditions that stimulated an abnormal development of that chin, and in each case we may have a normal, beautifully proportioned face. How little people realize that their natural, beautiful development is interrupted, and how willing they are to accept the idea that they only resemble their ancestry. Wonder what the physiognomist, the artist, the creator of modern literature will do when the world caters to its possibilities by early having these abnormalities corrected and developing physically and otherwise along normal lines.

We must grant that these physical defects do many times leave their imprint upon character and personality, but shall we not be cognizant as to why such things are true? When nature breathes us into the world for the first time, we are what we are from natural causes, and if there has been no congenital disturbance, are normal living creatures. From this time forward we are subjects of environment and physically and otherwise succumb to its influences.

It has been proven by contact with science that the primary cause of our existence and the paramount factor in our subsequent development is mechanical stimulation. The lion that must seek his prey in his native jungle develops along an entirely different line and in different proportions from the one reared in captivity. Just so, the skeleton of a man may depict his real life.

If mechanical stimulation is the cause of our development, what produces the stimuli and how may these forces be deflected and produce the abnormal? In answering the above let us consider these influences under two heads.

First, direct, or those forces which directly affect tissue development. Second, indirect, or those which, through systemic conditions and lack of nutrition, together with the psychic state, affect not only the physical development, but that of intellect and personality.

Under direct, let us consider the eruptive force of the teeth, interdependence of the two jaws, together with the forces of occlusion. As stated in a

former discussion, a child is born without teeth, at which time all the germs that develop the temporary teeth and six-year molars are in their crypts, suspended from the occlusal corticle plate. Crowns begin to grow, then roots, exerting a pressure upon crypt and occlusal plate, the crypt being forced back through cancellous bone. As these tooth cells multiply, stimulus is transmitted to the bone and the jaws begin to grow in three directions—forward, outward, and downward in the upper; and forward, outward, and upward in the lower. At six to eight months the bone has been absorbed over central incisors and they erupt, lowers first, then uppers; laterals a few weeks or months later, and so on at intervals until, by the time the child is two and one-half to three years of age, it has twenty teeth and there is room for no more. However, three more molars are to erupt posterior to the temporary teeth. The first permanent molars then begin their force of eruption, acting as a jack-screw, force being transmitted forward through the temporary teeth until at six years all have been carried forward with process a sufficient distance, and the first permanent molars take their places in the arch.

During this period the permanent incisors are developing lingually and deeper into tissue from the temporary teeth. Through their growth distance has been increased from floor of nose to alveolar border in maxillæ, and from lower corticle plate to alveolar border in mandible. Dr. Cryer says: "Up to this age greater amount of growth has taken place from mental foramen to symphysis in mandible, subsequent growth being greatest from mental foramen to angle of jaw, account stimulus transmitted from bicuspids and second and third molars in their force of eruption."

During this entire period the jaws continue to grow through three dimensions of space, and if jaws and teeth are performing their function, the child is breathing normally and all other forces of occlusion are normal, second and third molars will take their positions alike, exerting their greatest developmental influence until the nasal passages, dental apparatus, and entire face have developed in normal, beautiful proportions. If, however, some of these forces fail and a certain amount of normal activity of developmental cells is lost, we may have impaction of third molars or other irregularities, just in proportion to the abnormal influence of the forces of occlusion.

While the teeth are thus contributing their stimuli toward facial development, the other forces of occlusion each are playing their part and have their function to perform, if normal development is attained; muscular pressure and activity being among these influences. As has been recently mentioned by others, a child swallows once every one or two minutes. The action of the lips, tongue and muscles of deglutition in this capacity is important and cannot be ignored. The lips are moistened and closed, teeth brought in contact with each other, tongue pushed forward against the palate, the tensor palati muscle becomes active, bringing soft palate and tongue rigidly in contact with each other, obliterating any space in oral cavity; the child swallows, at which time there is an interchange of air in the middle ear through the eustachian tube.

In the act of swallowing the lips are stimulated to their normal growth, the tongue being brought rigidly in contact with palate, stimulating lateral growth of the maxillæ. A vacuum is created by tongue and palate, and a suc-

tion when tongue is released, which, together with air pressure, etc., in the act of nasal respiration, stimulates downward growth of palate processes and palate bones, hence development of nasal space. The teeth in occlusion at this time, together with action of muscles of mastication and all other forces mentioned, are conducive to symmetrical relations of the teeth and facial development according to the typal requirements of the individual.

Thus, you see, if the ideal facial development is ever attained, the teeth must harmonize with some ideal line. This has been designated as "the line of occlusion," not having reference to alignment of teeth in each individual jaw, but, quoting from Dr. Angle, means much more.

"It is that line with which, in form and position according to type, the teeth must be in harmony when in normal occlusion. There can be but one true line of occlusion, and it must be the same as the architectural line on which the dental apparatus is constructed. This ideal line was intended to govern not only the length, breadth and peculiar curve of the dental arches, but the size and pattern of each individual tooth, cusp and incline plane composing these arches.

"It must have been intended that the line of occlusion should be in harmony in form and position with and in proper relation to all other parts of the great structure, according to the inherited type of the individual."

Then we must see that just in proportion as the teeth in arrangement are in harmony with the "line of occlusion," so is the harmony and balance of the face affected, and to the extent we are able to conceive that the line of occlusion is the "basic ideal of the dental apparatus" and conform our activities to such, shall be our conception of what real orthodontia means and our successes or failures in it.

We have considered the effect of normal breathing on facial development with the force exerted by the act of swallowing. But suppose on account of some violation of the laws of nature, from hypertrophied pharyngeal tonsil or other nasal obstruction the child becomes a mouth breather, mouth being open, muscles that control the lips are relaxed and inactive; the upper lip, failing to receive its normal stimulus, stops growing; depressors of mandible are active, tongue drops back in the throat and not only fails to exert its normal stimulus in the act of swallowing, but partially obstructs the passageway to the lungs even through the mouth; the ears fail to receive an interchange of air; pressure being greater externally than internally, membrana tympanæ become deflected inward and finally thickened. As a result the child is hard of hearing.

Thus you may readily see that from lack of development the upper lip fails to perform its function, the maxillæ lose their lateral stimulus from the tongue, it being far back of its normal position. During this time the teeth continue to exert their developmental force, then as a natural consequence, there being nothing to interfere with forward development and nothing to stimulate later growth of maxillæ, a narrow V-shaped arch with high vault is the inevitable result. The arch is narrow, not because it has been contracted to any great extent, but because it failed to develop. The depressors of the mandibles have retarded its development, the lower six-year molars lock distal to normal, and

the whole scheme of the dental apparatus applies its stimulus to produce deformity.

Another child, though perhaps more fortunate as regards nasal respiration, has an attack of tonsillitis; the faucial tonsil becomes inflamed and hypertrophied, exerting pressure upon the muscles that form the pillars of the pharynx. In an effort to relieve this pressure the child pushes the lower jaw forward and the lower first molar locks mesal to normal. Again harmony and balance have been destroyed and asymmetry is the certain goal.

There are many other influences that affect physical development, such as habit, premature loss of teeth, bad dentistry, etc. However, a mere mention of them must suffice at this time, that we may pass to another phase of this subject.

In considering the indirect cause of physical development, together with that of mentality, let us first know the function of the nose. It is not strictly the organ of smell, but has a function that is four-fold, i. e., respiratory, phonatory, olfactory and gustatory. In addition to this it affects the auditory sense by equalization of pressure.

Under respiratory let us consider the function of the turbinates with their covering epithelium. This membrane is plenteously supplied with minute cells, the function of which is to secrete moisture; some authors have estimated this supply to be as much as three pints in a normal adult in twenty-four hours. In passing through the nose the air is freed of its impurities in two ways, i. e., by precipitation and by the antiseptic action of these secretions. In addition to this, it supplies the air with the proper amount of moisture, and by its thermal action reduces air, whether warm or cool, to about body temperature.

We readily see, then, how necessary to real life and health is nasal respiration, and why mouth-breathers cannot in any respect be normal. They lose that pint and quart of moisture, the antiseptic and purifying action and the thermal effect of the nasal space, allowing the air to pass into the lungs in a condition that not only incapacitates it as regards the purification of the blood, but in a condition that is almost incompatible with life itself. The tissues fail to receive their nourishment, leaving the brain and nervous system, as well as all of the organs and tissues, far below normal. Is it any wonder then that a weakness accompanies lack of development of the chin, or a so-called weak face, and the importance of the preservation of all in a developing child, and that mere family traits or depiction of character?

The psychic effect upon the child we have not mentioned, but it must not be forgotten. Many a child already handicapped by abnormal respiration and defective hearing, by a mere accident at six years of age, may start developing a face to belie its real character and personality. Nutrition is faulty, hearing defective, which renders it unable to grasp many things in the school-room. It becomes sensitive as regards its condition, delinquent in its classes, loses interest, together with the possibilities of living its real life, all because some one failed to appreciate the science of function.

The dental profession is in a position to recognize these prospectives before anyone else. Then let us study these deplorable conditions. We cannot all be orthodontists, but are we not, as a profession, duty bound to know enough about normal occlusion, the line of occlusion, and the laws of develop-

ment that we may at least intelligently advise those with whom we come in contact? Remember in each case the value of the wedging force of the teeth and the importance of the preservation of all in a developing child, and that extraction to correct an irregularity only leaves the same lack of development; and in Class II case where we have a narrow arch, a lack of development of nasal passages really lessens the size of the nasal space and increases the impossibility of the child ever breathing normally.

Remember the relation of the first molar, and never advise anyone to stand idly by and allow a child to develop a deformity, laboring under the pernicious idea that all of the permanent teeth must have erupted before any changes be made. Or again, that there is a possibility that the child and his jaws will continue to grow until the teeth finally have room to take their normal position. How absurd this is when we know that the wedging force of the teeth is largely responsible for facial development, and that if contact is broken and a tooth pushed out of line, the same forces that cause it to occupy that position will only tend to push it farther.

Remember that future development may be largely foretold at six years of age, and that to the extent the teeth harmonize with the line of occlusion, to that extent the harmony and balance of the face and development of the nasal passages are affected; to that extent also we are able to masticate our food and breathe properly, and to that extent our nutrition, general development, personality and life are affected. Remember that the face in its entire development may be the index to personality, and that if we appreciate these things in their fullest value the physical and mental development of the world may be revolutionized.

For the fundamental thoughts of this paper I am indebted to Dr. Edward H. Angle, Dr. F. B. Noyes, Dr. Lawrence G. Singleton, and others.

DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

JAMES DAVID McCOY, D.D.S., EDITOR
LOS ANGELES, CALIF.

PREVENTION OF MALOCCLUSION

X-ray Measurement of the Unerupted Permanent Teeth at the Age of Five or Six Years to Provide for Regulation of the Temporary Arch if Required.

BY SINCLAIR TOUSEY, A.M., M.D., NEW YORK CITY.

AT a meeting of the New York Institute of Stomatology in 1906, I showed a large number of radiographs of the unerupted permanent teeth of a great number of children, aged 5 or 6 years, taken in such a way as to show the actual width of the unerupted permanent upper and lower central incisor teeth. The idea was to furnish the orthodontist measurements of these teeth in hundredths of an inch and also a life-size diagram of the correct permanent arch calculated from a modification of Hawley's method; compared with the actual temporary curve obtained by biting a sheet of wax. The orthodontist was advised to correct the temporary arch if its radius of curvature did not equal that of the arch calculated either by my method or his own for permanent upper centrals of the width shown by the radiograph. In addition, measurements were recorded of the temporary teeth.

After five to eight years, as many as possible of these children were traced. They were purposely poor children who would not be likely to be taken to the orthodontist for correction. In seven of these original cases, I was able to trace and show at a meeting of the Eastern Graduates of the Angle School of

Fig. 1.

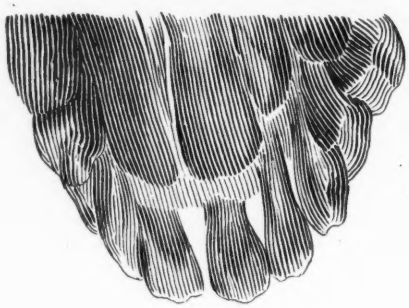

Fig. 2.

Figs. 1 and 2.—Radiographs of the permanent teeth before eruption. The width may be determined within 1/100 inch.

Orthodontia, the recorded x-ray measurements of the upper and lower central incisors were correct within $\frac{1}{100}$ inch. The width of the permanent upper and lower centrals bore no relation whatsoever to that of the same teeth of the temporary set. The broadest permanent teeth sometimes occurred with the narrowest temporary teeth. In every case the radius of curvature in the permanent arch was the same as that in the temporary arch whether that was right or wrong

Fig. 3-A.

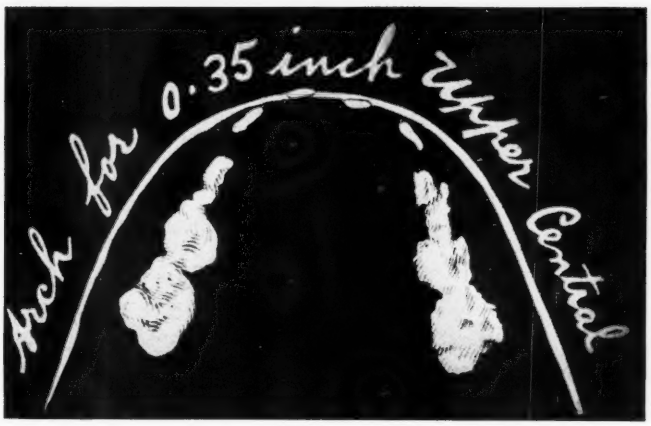

Fig. 3-B.

Fig. 3.—Temporary teeth arranged in curve corresponding to permanent upper central incisors 0.30 inch wide, while the x-ray shows the latter are 0.35 inch wide. Comparison between the existent curve and what the temporary curve should be regulated to.

for the permanent teeth. In cases with a temporary curve the correct size for the permanent teeth, the latter erupted promptly and in a uniform curve; but in the cases where the temporary curve was too small for the permanent teeth, absolutely no spontaneous expansion took place, and the varied permanent teeth were delayed in eruption and irregular in position.

After time had proven the correctness of my x-ray measurements, the non-relation in size between the temporary and permanent teeth and the reproduction of temporary arch without spontaneous correction in the permanent arch, I began to recommend x-ray measurement as a means of the prevention of malocclusion.

This is the best place to state that I do not regard the orthodontist as a "beauty doctor" but as the man whose duty it is to see that the child grows up with a healthily placed set of teeth and healthily formed nasal passages and healthily formed accessory pneumatic sinuses. The orthodontist knows better than anyone else in the community that without the correct size and position of the various parts enumerated, a formidable list of evils ensue. There is malocclusion with imperfect contact between the upper and lower teeth, more or less imperfect mastication and digestion and nutrition. Malocclusion with various teeth subjected to unnatural stress is a direct and frequent cause of pyorrhea.

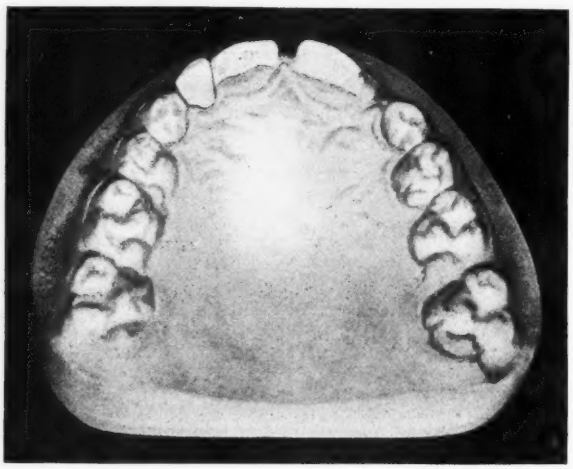

Fig. 4.—X-ray warning disregarded, no spontaneous expansion, non-eruption of one permanent upper lateral incisor; nasal operations have been required.

The arrested development or the misplacement of the permanent teeth leads to arrested development of the maxillæ and the nasal passages. The worst effects are produced when the dental arch is so narrow as to force the hard palate up into a high vault above which the nasal septum is crumpled up into spurs and deviations. The resulting obstructing of the nasal passages leads to adenoids and hypertrophied tonsils whose removal does not cure the mouth breathing. In fact, with such a start, life is one long series of throat and nose troubles and operations.

The ease with which the temporary arch can be regulated to the proper curvature is equalled by the ease with which at this formative period deviations of the nasal septum are corrected by expansion of the dental arch. The general physician knows that insufficient nasal passages predispose to tuberculosis and are directly opposed to longevity.

Many a case has come to me to determine the presence or absence of an unerupted tooth and I have had numerous opportunities to verify the fact that

in this condition the dental arch is too narrow for the width of the permanent teeth. I am fully convinced that there exists a causative relation.

Putting my discovery into actual practice, I have found that it is necessary to obtain a radiograph which shall show one of the upper central incisors directly facing the source of x-rays and not partially in profile. The first two radiographs locate the unerupted permanent tooth and a final radiograph is then

Fig. 5.

obtained from which an accurate measurement of the width of the tooth in question may be made. The crown of the unerupted upper central is fully developed at the age of 5½ years and has been shown over and over again to have exactly the same width that it has seven to ten years later. The orthodontist is given this measurement and also a life size drawing of the proper curve as compared with the actual temporary curve. This does not, however, mean that all jaws with upper central incisors of the same width shall be regulated to an identical curve. The orthodontist will take the nationality of the child and the type of face into account in deciding the form to be given to the arch, and use the measurement of the unerupted upper central as a guide to the radius or the size of arch required.

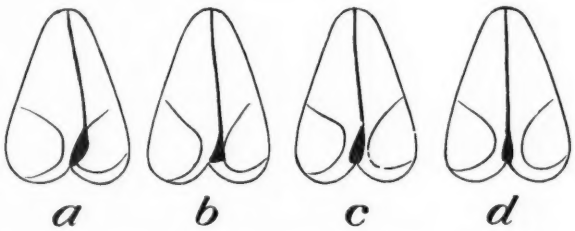

Fig. 5.—Deviations of the nasal septum in a young child straightened in a few weeks by regulation of the teeth. (Dental treatment by Dr. E. A. Bogue; nasal examination and diagrams by Doctor Berens.)

One example from actual practice is the daughter of a nose and throat specialist. She had a beautiful regular temporary arch of a radius corresponding to permanent upper centrals 0.30 inch wide. The radiograph showed permanent upper central incisors of a width of 0.35 inch and the fact that the temporary arch required corresponding expansion was pointed out. The orthodontist, however, expressed doubt as to the correctness of the x-ray measurement and the temporary arch was not enlarged. Later when the permanent upper centrals erupted they were found to be exactly of the width predicted by the x-ray and of course came in crowded and rotated; and the eruption

of one of the upper lateral incisors was delayed. Meanwhile the little girl was undergoing nose and throat troubles and operations. Later suitable regulation was done and a few weeks ago the father reported a splendid condition.

In another case, the x-ray measurement was implicitly relied upon and regulation of the temporary arch was performed. The permanent teeth erupted in excellent position and at an earlier date than the average and were of the width predicted. The child had been through operations for adenoids and tonsils before the x-ray examination was made and had been a small delicate girl with a sharp face. Now she is of the most robust appearance and wears clothes one or two sizes larger than girls of her age, and has normal occlusion.

Roentgenography and Dental Pathology.*

THE author emphasizes that properly made and correctly interpreted rœntgenograms of the teeth are of inestimable value in making diagnoses. It does not do to accept a rœntgenogram unless it is absolutely clear and shows the parts in every detail. On the other hand, even the clearest rœntgenogram is often misinterpreted.

On February 1, 1916, Dr. Brophy, before the Odontological Society of Chicago, spoke as follows:

"I have lately been impressed with the condition known as darkened area in rœntgen photographs not only from the work that I have had done, but on account of reviewing the work of others. It was not until probably four years ago that I was impressed with the mistakes I had made in reading x-ray pictures, and that was brought about in this way (I point this out because I am satisfied that a great many have made and perhaps are making the same mistakes that I did): At that time whenever I saw a darkened area around the apex of a root of a tooth I assumed that it meant the presence of an abscess, but when I made x-ray pictures of fracture of the mandible I found a well-defined line of fracture, for which I made use of splints, readjusted the fragments, restored the normal occlusion of the teeth, waited six or eight weeks, and then made another skiagraph of the same bone at the same place; I found exactly the same appearance that I found when I had the first skiagraph made, and concluded, before I learned better, that a fracture still existed. The newly formed bone was not sufficiently dense in structure, not sufficiently ossified to present the same appearance that the normal older bone did, so I was misled. Leaving the splints on for five or six weeks longer and again making a rœntgen photograph, I still found a well-defined line at the fracture; but feeling satisfied that the bone was united, I removed the splints and found that the bone had firmly united and was all right, yet at that time it showed exactly the same condition that it did when the first skiagraph was made. This led me to believe that I had been making mistakes regarding the darkened areas at the ends of the roots of teeth.

"Now I am convinced that these darkened areas we see on the plate are by no means evidence of an abscess. They are evidence, however, that an abscess

*Abstract from paper by Truman W. Brophy in Medical Clinics of Chicago, July, 1916; Reprinted from American Journal of Rœntgenology, October, 1916.

once existed, that the bone was destroyed or absorbed by pressure, and that perhaps there was infection of the organic matter of the bone to such an extent that some of the bone itself became disintegrated. In some instances we all know a great deal of the bone will become disintegrated and large cavities will be left at the ends of the roots of the teeth; but these large cavities, everything being done to exclude further infection by having the root well defined, will be filled by the new bone.

"In this connection I would like to state that at the meeting of the Clinical Congress of Surgeons of North America, held in Boston last fall, Dr. M. L. Rhein read a paper on this subject and presented by means of the stereopticon, some plates showing teeth, the roots of which were not well filled, with rather large areas of destruction at their apices. Then he showed the same teeth, skiagraphs of which were made two years later. He had removed the fillings from the roots of those teeth and refilled them, following which there was sclerosis, the bone was well developed, completely surrounding the end of the roots, and showing as complete an alveolus as surrounded any of the teeth with living pulps. The darkened cavities were filled with new bone."

Terminology.*

MUCH confusion could be avoided if all who write and speak concerning rœntgen ray work would adopt a uniform terminology. Skiagraph, skiagram, radiograph, radiogram, rœntgenograph, rœntgenogram, and x-ray picture are only a few of the terms which are used in manuscripts arriving at the editor's desk. It is highly desirable that rœntgenologists should devote special effort to the adoption of the standard terminology both in their writings and in their daily speech. Rœntgen called his discovery the "x-ray," but the civilized world has seen fit to designate this wonderful ray by a special name in honor of the discoverer, and the name Rœntgen has entered into the literature of all countries, including our own. Since the beginning of the great War the term Rœntgen has become distasteful in certain quarters and an effort is being made to revert to the older terminology. Our greatest American medical periodicals, such as the *Journal of the American Medical Association, Surgery, Gynecology and Obstetrics,* and the *Annals of Surgery,* have adopted the terminology which was given full approval by the American Rœntgen Ray Society at its annual session in Boston, in 1914. Appended will be found a list of the more important words relating to our specialty, which our members are urged to use, not only in writing, but in their daily speech.

The employment of the phrase "x-ray picture" is only more or less natural for the layman, but it should not be for the physician, especially one who practices rœntgenology. Rœntgenograms are not pictures in the ordinary sense of the word, and rœntgenology in its most valuable application to internal medicine is not a matter of rœntgenograms or so-called "x-ray pictures." Hence the employment of the term "x-ray picture" only serves to perpetuate an erroneous idea. While technical knowledge and practical experience are

*Reprinted from American Journal of Rœntgenology, October, 1916 (editorial).

required for mechanically perfect rœntgen ray work, the real work of the physician who specializes in rœntgenology does not begin until the image has been secured, and his work is therefore not in any but a small sense a photographic labor. It would be helpful if all physicians would discourage the use of this and allied crude terms, and adopt the standard terminology which has the unanimous approval of our national rœntgen society and the editors of our prominent medical periodicals. Some of the more important words relating especially to rœntgen work are included in the following list:

Rœntgen—pronounced rent gen.

Rœntgen ray—a phenomenon in physics discovered by William Conrad Rœntgen.

Rœntgenology—the study and practice of the rœntgen ray as it applies to medicine and surgery.

Rœntgenologist—one skilled in rœntgenology.

Rœntgenogram—the shadow picture produced by the rœntgen ray on a sensitized plate or film.

Rœntgenograph—(verb) to make a rœntgenogram.

Rœntgenoscope—an apparatus for examination with the fluoroscopic screen excited by the rœntgen ray.

Rœntgenoscopy—examination by means of the rœntgenoscope.

Rœntgenography—the art of making rœntgenograms.

Rœntgenize—to apply the rœntgen ray.

Rœntgenization—the application of the rœntgen ray.

Rœntgenism—untoward effect of the rœntgen ray.

Rœntgen Diagnosis—diagnosis by the aid of the rœntgen ray.

Rœntgenotherapy—treatment by the application of the rœntgen ray.

Rœntgen Dermatitis—skin reaction due to too strong or too oft repeated application of the rœntgen ray.

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EDITORIALS

Dental Societies and the Ownership of Papers Presented Before Them

A LARGE number of dental societies have published upon their programs, or somewhere in their constitutions, the fact that papers which are presented before their members shall become the property of the society. It is conceded that when a man gives a paper before a society at its invitation, the paper belongs to the society to use as it desires. In other words, if the society decides to have the paper published in a certain journal, the man who gave the paper has nothing to say in regard to it, because, after he has given it to the society, it is not his property, but the property of the society. However, we have known of several instances where men who have given papers before a society have withheld them from publication by the society, and have published them themselves in such dental journals as they have seen fit. This is an extremely unfortunate thing, and certainly is very discourteous. However, this very thing has recently been done by a very prominent man in the profession, who, having read a paper before a dental society which is publishing its own

dental journal for the purpose of elevating the science of dentistry, stated that, owing to the fact that the journal published by the society had such a small circulation, he would withhold his paper from publication therein, and publish it in one of the large trade journals, so that it would have a large circulation. It certainly was very discourteous; a very unprofessional thing for him to do; and a great insult to the dental society that invited him to read the paper. However, it has become the habit with a number of men to believe, whenever they consent to read a paper before a dental society, that they are honoring that particular society; while, as a matter of fact, we have always thought it a great honor for a man to be invited to read a paper before a dental society.

We do not believe that any one individual is as big as the dental profession as a whole; and, therefore, when a man assumes an attitude that he has the right to publish his paper where he pleases, regardless of what the society believes, it is time that something be done to make him realize that he is only one among the dental profession.

Dental Caries in Childhood

MODERN medicine is concerned with the prevention of disease and nowhere is there a wider field for the exercise of this function than during childhood. A preventive measure of prime importance is the care of the teeth. Unfortunately many dentists do not realize the importance of caring for children's teeth. They argue that it is not worth while caring for the deciduous teeth, and in reply to the statement that neglect of the deciduous teeth may result in permanent deformity they reply that the permanent teeth may be deformed anyway. Ignorance is the greatest obstacle in the way of securing proper dental care. Dental deformities frequently mean much more than merely deformities of the teeth. They may be responsible for deformities of the face and jaw, and they may be a factor in the production of adenoids, nasal hypertrophy, and tonsillar enlargements. The selection of a proper dietary has an important bearing on the development of the teeth. Malocclusion interferes with proper mastication and is therefore the starting point of many nutritional disorders. The digestion of starches cannot be normal if mastication is imperfect. Infections of the teeth cause dental caries and pyorrhea. The chemicobacterial theory is now generally accepted as explaining the causation of caries. On this theory caries is attributed to a fermentative process. Particles of carbohydrate food become lodged in the crevices of the teeth, fermentation takes place, and the acid products of the fermentation attack the enamel of the teeth. Hence the soft, sweet, sticky foods of which children are so fond may be regarded as a cause of dental caries. It has been found that pyorrhea alveolar almost always causes other infections. There is a definite relationship between pyorrhea and the various focal infections with which we are all familiar. The first step toward the relief of the present situation is to make the medical profession realize the significance of dental hygiene. Their interest must be stimulated so that they will undertake to awake a general interest in this subject in their own communities. The dentist must come to realize that he is not merely an

artisan and a mechanic, but that he is working in a definite field of medicine and that the care of the teeth of children is of sufficient importance to merit his most careful consideration. Parents must be made to realize the importance of proper development and care of the teeth in children and must be taught that such care is worth paying for. Proper provision should be made for the care of the teeth of children whose parents are unable to pay for this service. Every clinic for children should recognize that a dental department is an inherent part of its organization.

The President's Address Before the Fifteenth Annual Meeting of the American Society of Orthodontists

AT the fifteenth annual meeting of the American Society of Orthodontists, held in Pittsburgh, July 20th, 1916, Dr. E. C. Kemple delivered the following address (*Items of Interest,* October, 1916):

"It affords me a thrill of genuine pleasure to again greet the members and guests of this Society. With most of you it is like meeting old and close personal friends whose interests and aims are common with my own, and the grasp of whose hands stirs pleasant memories of our early meetings. I feel that this Society is much like one big family whose individual members are all laboring for a common purpose and all pulling together toward a common goal.

"It is a matter of personal regret however to many of us that we have just permitted an interval of more than two years to elapse during which time we have had no regular meeting. The value to us, as orthodontists, of these regular annual interchanges of ideas, and the opportunities they offer for a general and generous discussion of the many problems that constantly confront us in daily practice can not be even approximately estimated. They are as essential to the development and growth of orthodontia as wholesome food and drink are to the human body. It must therefore be recognized now as a serious mistake for our members to allow the schedule of any other convention to interfere with the regular annual sessions of this organization.

"I am constrained also on this occasion to congratulate this American Society of Orthodontists on its substantial stability as a progressive professional body, and on the steadiness and consistency with which it has pursued the even tenor of its purpose, without regard to or consideration of the determined and persistent efforts that are continually being made to wreck it. At the time of this fifteenth annual meeting our membership is larger than ever before in the history of the society, and I believe you will all agree, at the close of this session, that the program prepared by our Board of Censors for this occasion will compare favorably with any similar program to which it has been your privilege to listen.

"The candor and earnestness with which decided differences of opinion are here discussed are also matters for congratulation. 'When men smile and agree, Progress weeps,' is the assertion of an eminent surgeon in one of his

recent works. But when men disagree as decidedly as they do in this society, and still smile there is every reason why Progress should applaud.

"And this leads to the thought that progress—real progress—is seldom made by leaps and bounds, but almost invariably by a steady imperceptible advance, like the movement of the hands of a clock, or the growth of an oak. In medicine and dentistry—including of course the specialty of orthodontia—there must ever occur those occasional spasms caused by the announcement of some new idea that is hailed by enthusiasts as revolutionary to established methods. These predicted revolutions in our methods of practice usually result in nothing more than a nine days' disturbance of ideas. They occupy our attention for a very short time and quietly die, leaving as a heritage to the profession only a memory of another experiment that failed. And progress continues in her snail pace fashion.

"New ideas of practice have always received a cordial welcome at the hands of the members of this society; they have ever shown a willingness to test the clinical value of every idea advanced by trying it out in their individual practices, observing and noting its worth, and publishing their opinions broadcast to the dental profession. Our members have no mysteries to be hidden, no secrets to conceal concerning their modes of work. Every dentist and every physician who is interested in any manner in orthodontia is always cordially invited to attend all our meetings and to take part in the discussions. The purpose of this society is to educate its members along the broadest possible lines—for the advancement of the knowledge of orthodontia not alone among ourselves but among the dental profession at large.

"The deeper we go into the study and practice of orthodontia the more perplexing are many of the problems that confront us, the more insurmountable seem many of the difficulties that loom in our paths, the more ideals are shattered and the more failures there seem to be to stare us in the face.

"A few of our problems are being gradually solved, but in this, as in every other science, with each advance step that is made the field for study and research becomes immeasurably increased. The past decade can confidently be counted as years of remarkable progress in orthodontia, and yet an analysis of the literature covering this period will probably leave us with the conviction that we have scarcely scratched the surface of the subject of our study. One point of real advantage that has been reached through the past fifteen years of study is a complete realization of our profound ignorance of many of the questions upon which, fifteen years ago, we felt we were fully informed. Let us hope then that this is the beginning of wisdom.

"One of the weak points in the fabric of orthodontia to-day is the scarcity and incompleteness of our records of both treated and untreated cases. And I am more than pleased to have on the program of this meeting a paper by one of our veteran members on the subject, "The Records of an Orthodontist." To my mind this is one of the most important subjects with which we have to deal, because of the fact that in the final analysis these records must form the very foundation of our knowledge of malocclusion. One of the questions frequently asked by a parent who is considering the advisability of having orthodontic treatment for his child is: "What is going to happen if this work is not

done, if the teeth are left just as they are?" In the large proportion of cases that are presented for treatment, how many of us can answer that question intelligently and with any degree of assurance?

"To answer such questions intelligently requires a careful and thorough study of the complete records of a large number of untreated cases, and at the present time there are very, very few such records to be had, and while I recognize the difficulty of obtaining complete records of untreated cases, nevertheless I earnestly urge our members to secure as many of these as possible. We must have them if we hope to learn what is likely to happen in cases that are left untreated. And we must know what is likely to happen in cases that are left untreated if we hope to advise our patients intelligently.

"There is small doubt in my mind but that a careful study of even fifty or one hundred sets of models of untreated cases, the first taken, say, at the age of from five to seven years, and the last at from twelve to fourteen years of age, would greatly modify the present practice of early treatment.

"Another point that should be thoroughly studied and the observations carefully recorded and published by the members of this Society is the change that takes place in the glenoid fossa as indicated by the path of the condyle in both treated and untreated cases of malocclusion. We are probably all confirmed in the opinion that a very marked change takes place in this region in most of our cases during the period of treatment, but with our present knowledge, or rather our lack of knowledge, we can only blindly guess or surmise what this possible change may be.

"A collection of carefully made tracings of the path of the condyle, at the beginning, and at intervals during the course of treatment, and again a final tracing a year or two after the completion of treatment, might throw considerable light on what is now rather a dark subject.

"Dr. Milton T. Watson records the incident of one of his little patients, who was being treated for a Class 3 malocclusion, jumping out of bed at night and running to her mother with the joyful announcement that 'her jaw had just gone back.' It would be not only interesting, but instructive, if we could know just what took place when this jaw 'went back.'

In many Class II cases excessively deep overbites in the incisal regions have apparently corrected themselves during the shifting of the mesio-distal relation of the molars and bicuspids without any effort whatever on the part of the operator to control the overbite. In these cases also it would be instructive to know what change has taken place in the region of the glenoid fossa.

"I would suggest therefore that our members equip themselves with the means of studying the condyle path and that they make these tracings a part of the records of their cases.

"Almost since the beginning of orthodontia it has been a customary practice of all operators to place metallic bands on young teeth that are just erupting and to leave these bands cemented to the teeth for a period of one, two or even three years, with apparently no thought of the possible effect they have on the physiological and histological processes going on within the structure of the teeth so banded. It is rather unreasonable to believe that a young growing tooth can be incased in such an artificial covering for so prolonged a period

without there being produced some physiological disturbance within the body of the tooth which may considerably alter its histological structure.

"To find the answer to this question also offers an interesting bit of research for those of our members who are scientifically inclined.

"Through the efforts of a number of the members of this Society, and the co-operation of several metallurgists, the question of the best material to be used in the construction of orthodontic appliances has been fairly satisfactorily answered. This, together with the fact that this Society never occupied so strong a position in its history as it does at the present time, inspires me to recommend that committees be appointed to assist in the study of such questions as the changes in the region of the glenoid fossa, and also on the possible effects that cemented bands may produce on the internal structure of the tooth and many others of a similar nature.

"I am earnestly interested in seeing this Society devote its energies to such lines of research as may lead to tangible, practical solutions of the problems being investigated and that may culminate in the form of positive knowledge.

"I cannot close this address without expressing to the members of this Society my sincere appreciation of the honor they have conferred upon me by choosing me as their presiding officer for this session, and to acknowledge my grateful thanks to the Board of Censors for the splendid program which they have prepared for this meeting, and to the Secretary-Treasurer and the Vice-President for their willing co-operation in making this meeting a success."